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NEW METHOD OF DOCKING AND EXCAVATING CANALS AND OF RECLAIMING WASTE LAND.

A public benefactor has been tersely defined as the man who can cause two blades of grass to grow where but one existed before; in our belief, the term is equally applicable to the individual through whose inventive genius valueless bogs or dangerous quicksands can be reclaimed and transformed into solid *terra firma* for agricultural or building purposes. The slow and tedious method of accomplishing this work is already well known. The expense of a large force of men and the first cost of the cumbrous machinery is, as a general rule, so great that unless the land to be reclaimed is situated in a location which renders it of unusual value, the enterprise is rarely productive of profit or, at best, the capitalist is obliged to lay out large sums and wait patiently for returns that will cover the interest on his disbursements.

The new mode of docking and excavating canals, basins, and slips through marshes and low lands, which we now present, permits of the use of the excavated earth to grade the adjacent ground. Let the reader imagine the dock front shown in the foreground of the illustration to be the shore of a marsh land, of the nature represented in the distance, full of puddles and quicksand and apparently of no possible value. It is required to cut a basin into this ground at right angles to the line of the bank, say 100 feet in width, and at the same time to fill up the marsh on its either side, so as to make the latter valuable dock property, suitable for the erection of factories, lumber yards, etc. The breadth of the canal being marked out, an additional space of some 30 feet adjoining both boundary lines, thus obtained, is set apart, thus giving a width of 160 feet as an area for the excavating operations. Two pile drivers of the type shown in the engraving are next put to work on either side of this space, driving piles in parallel lines distant from each other from ten to twelve feet. As soon as four or five rows of piles are in place, pieces of sawn timber termed "adjustable" or "movable" caps are bolted to their tops with screw bolts, shoulders having been cut for them to rest upon. The caps are placed, as shown, parallel to the direction of the basin to be excavated, three rows at a time. Upon the first row and at right angles to it, a track is laid, consisting of heavy beams firmly braced and surmounted by iron rails. This track is movable and is not bolted to the cap pieces. Upon it is placed a dumping car, made after a patent of the inventor of the process we are describing, which is so constructed as to deposit its load in the ordinary manner and then immediately return, by its own gravity, to a position ready for filling. Attached to this car is a dummy engine, which draws it along the track. The preparation being thus far complete on one or both sides of the projected basin, dredging machines proceed with the excavation, digging out the interior of the slip close up to the first line of piles for the full width of 160 feet, but leaving directly in its center a "core" or untouched portion of soil. As fast as the dredge buckets remove the earth from the bottom, they are elevated on the derrick, swung over and dumped into the car on the rails. This, when loaded, deposits its burden on the rear side of the track and along the entire length of the same. As soon as the land along the line is raised to its required level, the track, car and dummy must be moved. This is done by attaching a chain or rope to the further end of the track, and bringing it to a powerful hand windlass some distance off. By this means the track is bent forward on the caps, as depicted in the lower right hand side of the illustration. Earth is then carried along and dumped into the additional space thus obtained until it is filled; next, the rope from the windlass is attached to the inner end of the track, and that is pulled forward, until it is even with the extremity first moved. The rails are once more straight, but now rest on the second row of caps. The first row, being of no further use, is unbolted from the piles in advance of the third row, and this is carried on in turn with each set of caps until the excavating is completed.

The dredger, meantime, having advanced 100 feet, a crib of that length is prepared of heavy timbers, firmly bolted together. This is towed into position on the bank of the slip and placed exactly on the before determined boundary line of the final width of the basin. As this cut is some 20 feet in width, and as it is placed on the 100 foot line, it must be seen that an excavated space of 10 feet will be left between its outer edge and the first line of piles. The crib is then filled with stones and sunk, the dredging machine proceeds with its work for another hundred feet, another cut is put in position and thus the operation continues until the entire length of the basin on both its sides is excavated, when all the cribs are finally built up even with the grade of the land

But the core of earth is still in the center of the basin. This the dredging machine now attacks, digging it up and throwing the earth obtained into the excavated space referred to, between the sunken cribs and the outer lines of poles, until the same is filled up level with the adjacent ground. Lastly, the bulk head forming the further end of the basin is built, and the work, with the exception of the finishing and planking of the docks and the final grading of the soil, is complete.

It will be seen that the loose clay and mud is held in the first instance in a measure by the numerous piles; but as soon as the cribs are sunk, its tendency to spread and fill up the basin is arrested, so that it is merely necessary to continue the filling and grading to render the ground perfectly firm. The wet soil from the bottom packs solid in the space of a year, and its surface is made smooth and hard by a top dressing of coal ashes. It thus, together with the piles (to which additional ones may be added), forms an excellent building foundation. This method has been thoroughly tested during the past three years along the water front of South Brooklyn, Long Island. In 1866, all that portion of the city bounded on the north by Third street, east by Fourth Avenue, west by the Gowanus Canal and south by Ninth street was a low, marshy piece of ground, mostly covered at high tide. The Brooklyn Improvement Company here own 600 lots, 25 by 100 feet each, having a water front on Gowanus Canal, and at that time valued at about $200 apiece. It was considered that the best that could be done with the property was to build a dock front, 150 feet long, on the canal, thus making 60 dock lots, 25 by 200 feet in dimensions, which would have been worth at most $10,000 each. Nearly 500 lots would thus be left unreclaimed and comparatively valueless, owing to the large expense incident to filling them up with earth carted to the spot. At length it was decided to adopt the novel plan which we have described. Work was accordingly begun, and it has resulted in the formation of slips at right angles to the canal, which afforded 7,250 feet of dock front or 600 dock lots. The cost of the labor was $70 per foot of dock, or in all $507,500. The value of the completed work is estimated at $400 per foot, or over three million dollars, each lot being worth to-day, instead of two hundred, from five to ten thousand dollars.

Some idea of the rapidity of the process may be obtained

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from the fact that, with a single dredger and one dummy engine and car, each basin, measuring 100 feet in width by 800 feet in length, was dug down so as to have 16 feet of water at high tide within the space of a year. Operations are still in progress in the above mentioned locality, which those interested in the reclaiming of land will find of exceeding interest to visit. The inventor and contractor, Mr. John B. Wood, or his agent, will be found upon the spot, or letters for further information relative to rights, etc., may be addressed to 390 Third st., South Brooklyn, N. Y.

THE WONDERFUL REGIONS OF THE WEST.

A member of the Hayden geological expedition, now engaged in surveying the National Park and portions of the Yellowstone river, writes some very interesting particulars to the *Evening Post*.

The branch of the survey under the immediate command of Professor Hayden, having gathered at Fort Ellis, organized as follows: Dr. Hayden, geologist; Mr. Savage, assistant; Mr. Burch, topographer; Dr. Peale, mineralogist; Mr. Holmes, artist; Mr. Logan, executive officer; Mr. Gannett, astronomer; Mr. Wakefield, meteorologist; Mr. Brown, assistant; Mr. Christman, photographer; Mr. Bingham, assistant; Mr. Platt, naturalist; Mr. Sloan, assistant.

The survey proceeded across the country to the Yellowstone River. The first natural wonder encountered was the peculiar formation of uplifted strata known as the Devil's Slide. This consists of two parallel walls of reddish clay, running down the side of the mountain with a smooth surface between them, supposed to be composed of cinnabar, the whole forming a curious freak of Nature.

HOT SPRINGS OF GARDINER'S RIVER.

The calcareous deposit along the route announced an approach to the famous Hot Springs on Gardiner's River. We encamped at the foot of the hillside whose surface they have encrusted with such beautiful formations. The snowy whiteness of the deposit, sparkling under the sunlight, presented the appearance of a frozen cascade. The next day a closer inspection revealed new beauties to our gaze. The upper plateau, elevated about two hundred feet above where we were encamped, was covered with little pools from six to eight feet in diameter and varying in depth from a few inches to several feet. The edges were rounded, by the outflowing water, as beautifully as if carved by hand; indeed, they resembled the basins of artificial fountains. The interiors were stained with yellow, red and green from the deposits of sulphur, iron and copper with which the waters are charged, the whole resembling an artist's palette covered with patches of most brilliant colors. A white cloud of steam rises from the mouth of the main spring flowing from the crest of the hill. It is about thirty feet in diameter, while the water is so transparent that one can gaze into the ultramarine depth, but looks in vain for the bottom. The temperature of the water is 132 degrees Fahrenheit. The water escapes into the basins below, where one can bathe, regulating the temperature according to the distance from the source. The edges of these natural bath tubs are decorated with a beautiful bead work that it would be almost impossible to imitate by art.

Not less wonderful, though not so beautiful, is a calcareous cone rising, from out the plane skirting the mountain, to a hight of fifty feet, with a diameter at the base of about twenty feet. It is evidently an extinct geyser, and is formed, like the High Rock spring at Saratoga, by the deposit of the never ceasing flow, forced upwards by the pressure beneath. This, from some natural cause, is gradually closed at the summit. It stands as a monument of a former age.

The country from this point became more difficult to travel, as we were approaching the land of cañons. Several tributaries of the Yellowstone here empty themselves into the main river.

THE GREAT FALLS OF THE YELLOWSTONE.

Two days march brought us to the mouth of the great cañon. Riding along the high plateau crowning its side, we first noticed the basaltic columns, capping the opposite bank with a regularity resembling Art more than Nature and presenting an appearance not unlike a fortification. It is similar to the formation of the Giant's Causeway, and reminded me of that curious place. The scene below was almost fearful to behold, the river fairly lashing the rocks in its rapid descent at the bottom of the cañon one thousand feet deep. The roar of the great falls first announced its presence, and a rapid ride, though scarcely apace with our eagerness, brought them in view.

What shall I say in their praise? How describe them? Montmorency excels in hight: Niagara, in grandeur and force; Trenton, in beauty; but the great Yellowstone Falls combine the beauty of all three. The river flows smoothly as it approaches this, the natural floodgate of the great lake, until, narrowed by the rocks, it precipitates itself over the ledge and falls three hundred and fifty feet on the rocks beneath, sending up a cloud of spray and making a roar that can be heard for miles around. Grandeur and sublimity only can describe the scene.

THE EXPLODING MUD SPRINGS.

About ten miles above the falls we came to a most interesting group of hot springs, named the "Seven Hills." One of these had a powerful steam vent, making a noise resembling a high pressure engine, which we named "Locomotive Jet." The temperature was 197 degrees Fahrenheit, which at this high altitude is boiling point. The crust surrounding the mouth is ever hot, and yet so strong that we could walk over it; and the entrance can only be approached on the windward side, so burning is the cloud of steam emitted from the cavern.

Phenomena of the same nature, but more curious, are the mud volcanoes existing at this place. These are formed by the boiling water forced through beds of clay, softening the earth, and agitated by the propelling gases, thoroughly mixing the same. The gas continually escapes in puffs until, accumulating in sufficient quantity, it finds vent by exploding, throwing the mud from twenty to fifty feet into the air, and sometimes even as high as a hundred feet, as the bespattered branches of the surrounding pines attested.

The Greenland Meteorites.

Professor Nordenskjöld has communicated to the Geological Society a paper on the remarkable masses of meteoric iron from Greenland, discovered in 1870 at Ovifak, and brought home last year by the Swedish expedition under Baron von Otter. They are the chief masses of an enormous meteoric fall which probably occurred during the miocene period, and extended over an area of two hundred English miles, embracing not only that region occupied by the Greenland basalt, but a country composed of granite-gneiss. The theory having been advanced by some geologists that these masses of metal are erupted and not meteoric, Professor Nordenskjöld maintains his view of their meteoric origin on the following grounds: The iron when heated evolves gases amounting in volume to 100 times that of the iron itself; it contains isolated grains of iron sulphide embedded in the iron, which, it was noticed, contains scarcely any sulphur, while the external form of the masses exhibits no trace of their having been poured while in a molten condition into a cavity or fissure. The character of the masses is extremely variable: they are composed of meteoric nickeliferous cast iron, or of nickeliferous wrought iron, or a mixture of both; and in the last case they exhibit most clearly the peculiar figures brought out by etching.

The native iron occurs in the basalt in several forms. It is met with as enclosed and but slightly altered meteorites. It is found filling cracks one or two lines in width, forming probably fragments of meteorites that have been flattened out under the influence of time, or wedged into these cracks in the act of falling, or which have fallen into cracks in the tuff that has been subsequently consolidated. Moreover, brecciiform stones occur, which are composed of fragments of iron cemented together with hydrated oxide of iron and newly formed silicate of iron. Close beside the iron masses in the basalt are found fragments of rock, differing from the basalt itself, and remarkable for being rounded at the edges and having what resembles a meteoric crust on the exterior. The Professor as yet finds himself unable to express any opinion as to the cause of this curious association. Besides all these forms, the native iron is disseminated through the basalt in grains sometimes as large as a pea or bean, but oftener as fine scales.

Within an area of at most fifty square meters were found sixteen meteorites, the weights of which, in Swedish pounds, are as follows: 50,000, 20,000, 9,000, 336, 230, 200, 191, 150, 150, 150, 100, 56, 42, 15, 8, and 6. The three largest have the following diameters, respectively: 2 by 1·7 meters, 1·3 by 1·27 meters, and 1·15 by 0·85 meters. Nearly 100 pounds of lenticular shaped fragments of iron, from three to four inches in thickness, were also taken out of the basaltic dyke close to them. All the masses contain nickel and carbon.

What an Editor Saw in Colorado and the Rocky Mountains.

Mr. Henry T. Williams, editor and publisher of the *Horticulturist*, writes home to his readers a series of letters which he terms "Floral Rambles." We extract from one of these the following:

"Think, ye stay-at-homes, of a ride for six hours with the Rocky Mountains on one side of you, their summits capped with snow and gilded with the unreserved splendor of the sun; then look between you and them and see peaceful valleys and natural parks, the home of thrifty cattle or happy ranchmen's cabins; then to the left of you, and in fact all around you, a paradise of flowers. Never shall I forget one sweet spot, just before reaching the top of the divide, 40 miles from Denver. We stopped in the midst of a prairie thickly clustered with the gilia.

The startling, blazing crimson of the gladiolus was but an ineffectual comparison to the splendor of the colors of these native floral maidens. Rearing their tall stems upward 2½ feet, surmounted with the dazzling crimson, pink and white bells, and millions of them in sight, hardly permitting room for the foot to rest without breaking one—it was indeed a 'joy never to be forgot.'

Acres of sunflowers were strung along our track. Then too, we saw the Mexican poppy, with its pure white, delicate leaved blossom, upward turned as if to drink in the exhilarating sunlight; the ipomæa, or Rocky Mountain creeping convolvulus, hung for us its blue, bell-like blossoms; myriads of little prairie roses blushed with their light pink bloom; lupins erected their stately blue heads, and scores of others, till we were fairly bewildered. * * *

Imagine, then, some of the delights of floral rambles and botanizing among these Rocky Mountains. Perhaps the botanist now coming may not find anything new, where so many have gleaned the field before, but he will always be entranced with the profusion of the flowers, the unusual brilliance of colors, the grandeur of the mountains, the ascent of the peaks, the sublime, inspiring atmosphere, the exhilaration of spirits, and, best of all, a grand appetite, with invigorated bodily powers.

Colorado Springs nestles at the foot of Pike's Peak, a beautiful home for any invalid. Standing on the plains of Fountain Colony, six miles away, where General Cameron had gathered 1,000 inhabitants in one year, there is revealed to you the very best glimpse of the mountain. 'Tis a picture of boldness and variety of color unrivalled in America.

Go, then, to Colorado, and enjoy, besides the flowers, its canons, its scenery, and life-giving atmosphere. One fact seemed curious to me. At elevations of 8,000 feet, I found better lands, a better climate, the temperature was more equable, grass greener, almost perennial in growth, and cattle grazing the year round. Flowers, too, were more profuse and brilliant. Above this the air is too cold and forbidding. Below this brings you to the warm plains, uncertain showers and dry grasses.

At 6,000 to 8,000 feet, I noticed the *euphorbia variegata* in full bloom, well opened out, when for hundreds of miles, the week previous, I rode through central and Western Kansas, 4,000 to 5,000 feet lower, yet it had not opened one fourth of its leaves."

Coal near San Francisco.

For more than a year past it has been quite definitely known that coal existed in apparently workable quantity and of good quality, at a point some six miles from Oakland Center. Recent developments are reported to have shown a vein near the surface, with a thickness of three feet and upwards, and of a quality superior to that obtained at Mount Diablo, and so free from sulphur that iron may be welded with it without difficulty.

The location is at an elevation of about 700 feet above the level of San Pablo Creek Valley, and three quarters of a mile north of the telegraph road. It stands at an angle of about 30°, where it has been opened in a shaft 30 feet deep.

The mines could be reached from Oakland by a roadway through the proposed tunnel of five or six hundred feet, with a grade easy enough for horses to trot up or down. It is said that several enterprising capitalists of San Francisco are interested in the mines, and that coal thence will soon find its way to this market, where it is thought it can be delivered at a cost of only about $3.50 per ton. Adding a fair profit to that figure, this coal if it can be so delivered and is of the quality represented, will prove by far the most important coal discovery on the Pacific coast. With good coal laid down in the city at $5 per tun, there is no reason why San Francisco should not become one of the largest manufacturing centers in the country.—*Mining and Scientific Press.*

Sugar in Urine.

Seegen finds that when the urine contains mere traces of sugar, it gives with the potassic tartrate of copper a mere doubtful deposit of suboxide of copper, of a modified color, and which might be due to the presence of uric acid. He therefore filters the urine through good animal charcoal, washes this with a little water, and searches for sugar in the washing water, which gives as distinct a reaction as a solution of pure sugar. We may thus detect sugar in urines which contain only 0·01 per cent. With urines richer in sugar, that is, containing 0·05 per cent, we obtain in the washing water a precipitate much more distinct than in the urine, either in its original state or after filtration over animal charcoal. A solution of uric acid containing 0·1 per cent gives a decided precipitate of the suboxide of copper; but if the liquid is passed through animal charcoal, all the uric acid is kept back, and the filtered solution no longer reduces the double tartrate of potash and copper. This method is not applicable to quantitative determinations, a part of the sugar being retained by the charcoal.

Dust thrown up by Vesuvius.

During the eruption of Vesuvius which took place last spring, Naples and the surrounding country were visited by a shower of fine black dust. In some places the fall was very heavy, and even in Ischia, at 25 miles distance from the mountain, where the dust examined was collected, the quantity was sufficient to cause great annoyance to the inhabitants. It consisted of aggregations of crystallized quartz, dotted over with the magnetic oxide of iron. This ferroso-ferric oxide was also crystalline, and possessed a high metallic luster. The grains were very uniform in size, and would pass through a wire gage, the apertures of which measured the 16,000th part of a square inch. By boiling the sand in hydrochloric acid, the whole of the iron is removed, and nothing but crystals of pure white quartz remained. Its composition is the same as that of the iron sand which is found in the soil in some parts of the country round Vesuvius, and which is the product of former eruptions; the latter, however, obtains a larger relative proportion of iron, and the grains show a water worn appearance under the microscope. Neither of the Vesuvian specimens contain titanium, which is found in the magnetic iron sand of New Zealand, which has most likely been ejected from the great volcano of Mount Egmont.—*G. Gladstone.*

GLYCERIN IN GAS METERS.—In Dresden, glycerin is generally used in place of water; after it has been so used for some years, it becomes foul and requires purification. The fluid is first heated for 12 hours to from 50° to 60°, and next to from 150° to 130° in order to eliminate water, ammoniacal compounds, and other volatile impurities; the glycerin is next filtered over granulated animal charcoal. Some 300 to 400 cwts of glycerin are annually purified in this manner at Dresden.—*Hasse.*

IT appears to be general opinion on the Continent that the only possible field pieces are breech loaders. Besides being more rapidly manœuvred, they require fewer men, and greater accuracy in aim is obtained; and they possess many other good qualities. It is still, however, a moot question of what material they shall be composed, some being strongly in favor of bronze, while others as strenuously advocate steel.

The Ophir Mines of Utah.

A correspondent of the *Evening Mail*, writing from Salt Lake city, relates his adventures among the Utah mountains, and thus describes the process of mining, and how the silver is extracted from the ore:

Ophir city, says the writer, is an admirable specimen of the mining camp of our country. Two years ago the cañon was in primeval loneliness and desolation; to-day it is lined with log houses and lumber shanties, while billiard saloons, bowling alleys, a telegraph station, and a bank exchange are established institutions.

On Sunday morning I turned out for a *douche* under the mountain stream, and then started to explore the Miner's Delight. At so great an altitude as 7,000 feet above the sea level, exertion becomes very oppressive, the air being so rarefied and the lungs feeling as if they didn't get half enough air or inspiration; the nose is liable to bleed, and if that should occur, the difficulty is to get it to stop. I escaped this latter casualty, and after a stiff climb, during which we paused frequently to admire the scenery and take breath, arrived at a yawning chasm, piercing deep into the bowels of the earth, closed with a wooden gate. That opened, I left daylight and, putting one foot in a loop while I balanced myself with the other, was let down a shaft some 170 feet in depth to a chamber excavated out of the solid rock, whence galleries branched out in different directions. The interior of a silver mine is to the unskilled visitor not very interesting; he is unable to discriminate between the varieties of ore and the general appearance presented to his eye is that of a dull yellow or grayish rock, crumbly in texture save where strata of quartz or granite intervene. Here and there the galleries opened into spacious chambers, propped and supported by strong logs of timber where the vein has branched out. There has as yet been no native silver discovered in this locality, the previous metal being found as sulphide, chloride, and pyromorphite in juxtaposition and combination with every known metal, tin alone excepted. Lead, iron, copper, and antimony are found in large quantities, and traces of gold are occasionally met with. The former ones are neglected, and the latter has not been discovered in sufficient quantities to justify exclusive attention to its production. The surface formation is limestone, but on the deep levels the course of the vein is traceable through the primary stratum. In mines as yet undeveloped the attention of the miner is confined to the external deposits, which are unreliable in continuance; whereas in those which are worked by capital, deep shafts are sunk with a view to striking the main lode and so securing an unfailing supply.

There are three methods by which the silver is extracted from the ore, two of them—milling with stampers and working in an araster—being based upon the power which mercury possesses of forming an amalgam with silver and gold; the third being a melting process by which silver and lead are run off into ingots of impure metal technically termed bullion. Those ores which contain 25 per cent of lead are melted, while the other ores, in which copper, antimony, iron, and sulphur are present, are treated by dry or wet milling. In melting, an ordinary melting furnace is charged with alternate layers of charcoal, ore, and flux, and a steam blast, on the same principle as that used on locomotive engines, is introduced to create a violent draft and so expedite combustion. There are two tap holes at different distances from the base of the furnace, through the upper of which the slag flows out, while the base bullion is run off from the lower aperture into molds.

Milling may be divided into the dry process in a damp mill, and the wet process in an araster. In the former, the ore is first baked in a kiln and then reduced to a fine powder by the continued action of heavy rammers or stampers, which fall upon it and crush it to an almost impalpable dust. If the ore contains sulphur, it is then mixed with common salt and submitted to the action of fire in a reverberatory furnace; the sulphur is sublimated while the chlorine of the salt takes its place. When sufficiently roasted, the powdered ore is conveyed to revolving barrels with mashers in the interior, mercury and a little water are introduced, and the apparatus is agitated for about six hours until all the silver has been taken up by the mercury to form an amalgam, which is then drawn off and strained through a common leather bag. The uncombined mercury drains off, leaving a compact amalgam about the consistence of putty, which is retorted; the mercury distils away and is condensed for future use, and the silver remains in a porous state. It is then remelted and cast into ingots of pure metal ready for the market. The araster is a Mexican machine, and is a cheap substitute for the more expensive outfit of the stamping mill. It is worked by water and consists of a large tub, some seventeen feet in diameter, floored with rock; a transverse bar, to the extremities of which ponderous stones are attached, revolves above, and the tub is filled with a mixture of pounded ore and water. The stones revolve until the grit is all worn away, and then the fluid is transferred to the amalgamating barrels. The remainder of the process is identical with that described above.

So much for mining, milling, and smelting. There are a number of mining districts around Salt Lake city; in fact, every cañon is a district.

How to Secure a Pleasant Expression.

One of our city papers is responsible for the following: Mr. Charles Williams has lately attained celebrity as a sneak thief. Having stolen a lot of laces from a shop in Grand street, been arrested, escaped from the officer, and been recaptured, it was ordered by Superintendent Kelso that his picture should be taken for the celebrated "rogues' gallery." To this Charles, modest as regards his pretensions, no doubt, demurred. When placed in the chair, and the instrument brought to bear on his face, he fell to making the most horrible grimaces, shut his eyes, opened his mouth, and resorted to other devices not improving to his naturally prepossessing countenance. On a second attempt, the unwilling sitter kicked over the camera and knocked out one of the lenses. Finally, by dint of handcuffs and a strap under his chin to keep his mouth shut, a picture was got of the engaging youth, the sole defect of which is that the eyes are closed. Thus the "counterfeit presentment" of Charles, wrapped, to appearance, in infantile slumber, now graces the wall of the rogues' gallery. If all the people gifted with no greater share of beauty than this ornament to society were equally averse to its reproduction, the number of hideous countenances at the doors and in the rooms of the photo graphers would be vastly diminished.

Gold and Platinum in Russia.

The *Gorni Journal* of St. Petersburg gives some interesting notes on the production of these precious metals in the Muscovite empire. In 1868 were produced (in 993 gold stream works, by 56,261 men, from 14,365,550 tuns of gold sand,) 56,068 lbs. of gold, the raw sand yielding 0·000195 per cent on average. The greater part was washed in Eastern Siberia, where the richest stream works exist. At the Government gold diggings, or stream works, near Miask, in the district of Slataoust, the gold bearing stratum of sand is about 2½ feet to three feet thick, covered by 15 feet, of dead gravel. The uncovering of the beds and the delivery of the gold sand to the washing establishments is generally done by contract, and by the cubic fathom. The raw material is first screened in a stream of water, when the small parts flow through ½ inch sieves upon buddles with transverse wooden laths, behind which the gold particles principally collect. Every 6 or 12 hours, according to the produce of the sand, the laths are removed and the tables washed clean with scrapers, brushes. etc., of this concentrated material, while larger lumps of gold are collected upon the screen from between the larger pebbles. At the larger works the extraction of the metal from the concentrated sand is done by steam power, when the sand is washed through a fine sieve upon a buddle with American frame, where the stuff is still more concentrated, and finally finished upon handwashing machines. When the raw sand contains much clay or loam, perforated rotating drums are used, instead of simple screens. The washed gold generally contains 10 per cent of silver. Where only hand power is used, 40 men will wash in 10 to 12 hours 40 to 60 tuns of sand, while with the use of machinery 150 men and 50 horses will wash eight to ten times that quantity. The greatest and most productive goldfields of Russia will always be those of Siberia.

Platinum is always washed together with gold, and the production of raw platinum rests finally upon a separation from gold, with the exception of a single locality. The mixture of gold and platinum which is brought to Tagilsk is classified in two sorts. Both are treated with mercury, when the gold is dissolved, while the platinum is left as a residue which is separated from the amalgam by washing. The latter is pressed through a leather bag, and the gold obtained by distilling off the mercury. The raw platinum is by no means clean, but some samples contained, after M. Le Play, other metals, such as platinum, 75·1, palladium 1·1, rhodium, 3·5, iridium, 2·6, osmium-iridium, 0·6, osmium, 2·3, gold, 0·4, copper, 1·0, iron, 8·1, residue, 4·5. The raw platinum is generally sold to England and France at a price of £15 per pound platinum. The production of this metal was from 1828 to 1845—5,247 lbs. on average, and is now 4,000 lb. per annum. The principal platinum stream works are in the Ural Mountains, near Nischnei Tagilsk, and belong to Prince Demidoff and the Russian Government.

Moths among Clothes.

"To prevent the ravages of these insidious pests, the first desideratum is a box with a close fitting lid. Nothing else will serve the purpose of keeping out the moths for any length of time; for where they cannot get in bodily, they will thrust in the ovipositor, and deposit their eggs. To destroy the larvæ and moths, if they have entered, benzole will be found the most efficacious. This may be sprinkled over the apparel; if as before mentioned, the lid is close fitting, the benzole will retain its influence for a length of time. If economy is an object, rags saturated with turpentine, alone or mixed with benzole, may be placed in a corner of the box. It need hardly be stated that a light should not be brought near the box when first opened, as the vapor of benzole is highly inflammable, but soon passes off."

The above item, from an exchange, is all well enough, except the advice to use benzole, which is more dangerous than gunpowder. The latter requires that fire shall not be carried into contact with it, but the vapor of benzole travels of itself to the lamp and explodes. Almost any highly odorous substance will be found useful in place of benzole. For example, cedar wood or camphor may be used, and they have the advantage of being safe.

A New Life Preserver.

A correspondent, Mr. S. H. Starr, writes as follows: "I suggest the following as an improvement: A rubber garment like a pair of trousers, boots and all in one, lined with woolen stuff, reaching from the soles of the feet to the armpits, into which the person could thrust himself or herself, and then secure the garment in place by straps passing over the shoulders. Inside or outside of the garment, under the arms, reaching down not much below the chest and forming a part of the garment, should be the buoying device, say an air chamber surrounding the garment, or better, a chamber filled with cork chips, for when so filled an accidental leak will not destroy its buoyant qualities. Such a garment would securely buoy the body, and at the same time protect it from wet and cold."

Patent Office Decisions.

INTERFERENCE.—ALLEN AND MOODY *vs.* A. C. GILMAN'S LOOM TEMPLE PATENT OF SEPTEMBER 4, 1872.

LEGGETT, *Commissioner:*

Perhaps nothing less than fraud should be considered a sufficient cause for relaxing the rule that a party shall be bound by the date of invention set forth in his preliminary statement.

The question of reasonable diligence only arises between applicants where one is first to conceive the idea of the invention and the other is first to perfect it and reduce it to practice.

Acknowledgment by an inventor of the right to a patent to be in another, and assent to its grant to him—having been so decided by the Supreme Court of the District of Columbia—is not, after its grant, a bar to a subsequent grant of a patent for the same thing to the inventor. Decision of the Board of Examiners in Chief reversed, and priority awarded to Allen and Moody.

The Ransome Artificial Stone.

INTERFERENCE—RANSOME, BESSEMER & RANSOME *vs.* THE PATENTS OF RICHARD NORRIS, JR., NOS. 89,884 AND 92,345.

LEGGETT, *Commissioner:*

Both these alleged processes are designed to be employed in forming the Ransome concrete stone. This stone is a compound of silex and silicate of calcium; but, the latter being insoluble, it is found impracticable to cause their direct mixture and union to form a solid. This is accomplished by first forming a plastic mixture of silex and soluble silicate of soda, and then permeating it with chloride of calcium. The effect is to form silicate of calcium and harden the mixture, and at the same time leave a residuum of chloride of soda, which must be washed away. This effect was first accomplished, imperfectly, it is said, by merely bathing the plastic mixture first formed in chloride of calcium, or by forcing the latter into the interstices of the former by pressure within an exhausted receiver. (See English patent of Frederick Ransome, No. 877 of 1861.) This latter process of placing the plastic mixture in an exhausted air tight vessel, and then admitting chloride of calcium and applying hydraulic or other pressure to it, is the one first described in the Norris patent of July 6. The one next described, which is alleged to be much superior, is that now in controversy, and consists in placing the plastic mixture described in a vessel having a perforated bottom inclosed by an air tight chamber, which is connected by a pipe with an air pump. Chloride of calcium is placed in the vessel over the mixture, and the air exhausted from beneath. Pressure from above other than that of the atmosphere may or may not be applied, at option, to drive the solution through the mass. Afterward water may be applied in the same manner to wash away the residuary chloride of soda. This is termed the "filtering" process. It is evident to me that by the process first named, or the "exhaust" process, the chloride of calcium or water could only be forced *into* and not *through* the mass, as by the filtering process, which affords an opportunity for its escape. It is also evident, and is in proof, that the result of employing the filtering process would be a more perfect hardening of the stone in all its parts than could be accomplished by the exhaust process. I regard these processes, therefore, as materially different from each other.

I agree with the Board that the rebutting evidence put in by the applicants was properly admitted and considered by the Primary Examiner, and their decision, awarding priority to Ransome, Bessemer & Ransome, is affirmed.

Patent Decisions of the Courts.—United States Circuit Court, Northern District of New York.

BUERK *vs.* VALENTINE.

In Equity.—Before Woodruff, Circuit Judge.

This was a suit in equity, brought by Jacob E. Buerk against Dennis Valentine for the alleged infringement of two several letters patent for watchman's time detectors, granted to complainant June 5, 1865, and March 8, 1870, the latter being a reissue of the patent originally granted to one John Buerk.

The mere fact that defendant's machine has specific points of difference as compared with complainant's will not protect him from liability, if complainant's patents are valid and the devices protected thereby are incorporated in defendant's machine.

John Buerk held to be the first inventor of a time detector containing a combination of spring points to be operated upon by a series of keys (susceptible of numerous combinations) with a watch movement, all in one case, carried by the watchman, and by successive punctures indicating the particular key, and thereby the station at which each was made.

Such a device is not anticipated by a detector operated by pressure upon a pin or button exterior to the instrument, and in which the record might be made irrespective of the station at which the instrument may be at the particular time.

Making a prior device which will serve a like useful purpose is not necessarily anticipating an invention.

Where the mechanical means employed are different and the mechanical result is different, one does not anticipate the other.

Where the defendant placed the spring points in his time detector in the lid of the box or case, perforating therewith downward, instead of placing them under the plate or frame supporting the watch movement and perforating upward, although he was thereby enabled to dispense with the annular fixed index, for which he substituted the mark of an arrow: Held, that the mechanical construction was the same in all that constituted the principle or mode of operating the instrument.

Where a patent was granted for fourteen years from January 1, 1861, instead of fourteen years from October 29, 1856, the date of the French patent upon the same invention: Held that the error was a proper one to be corrected by reissue.

A complainant's rights under such a reissue are not other than those of any inventor whose first patent is void for mistake or error which is corrected by a reissue.

He cannot recover for alleged infringements prior to reissue, but may for subsequent infringements.

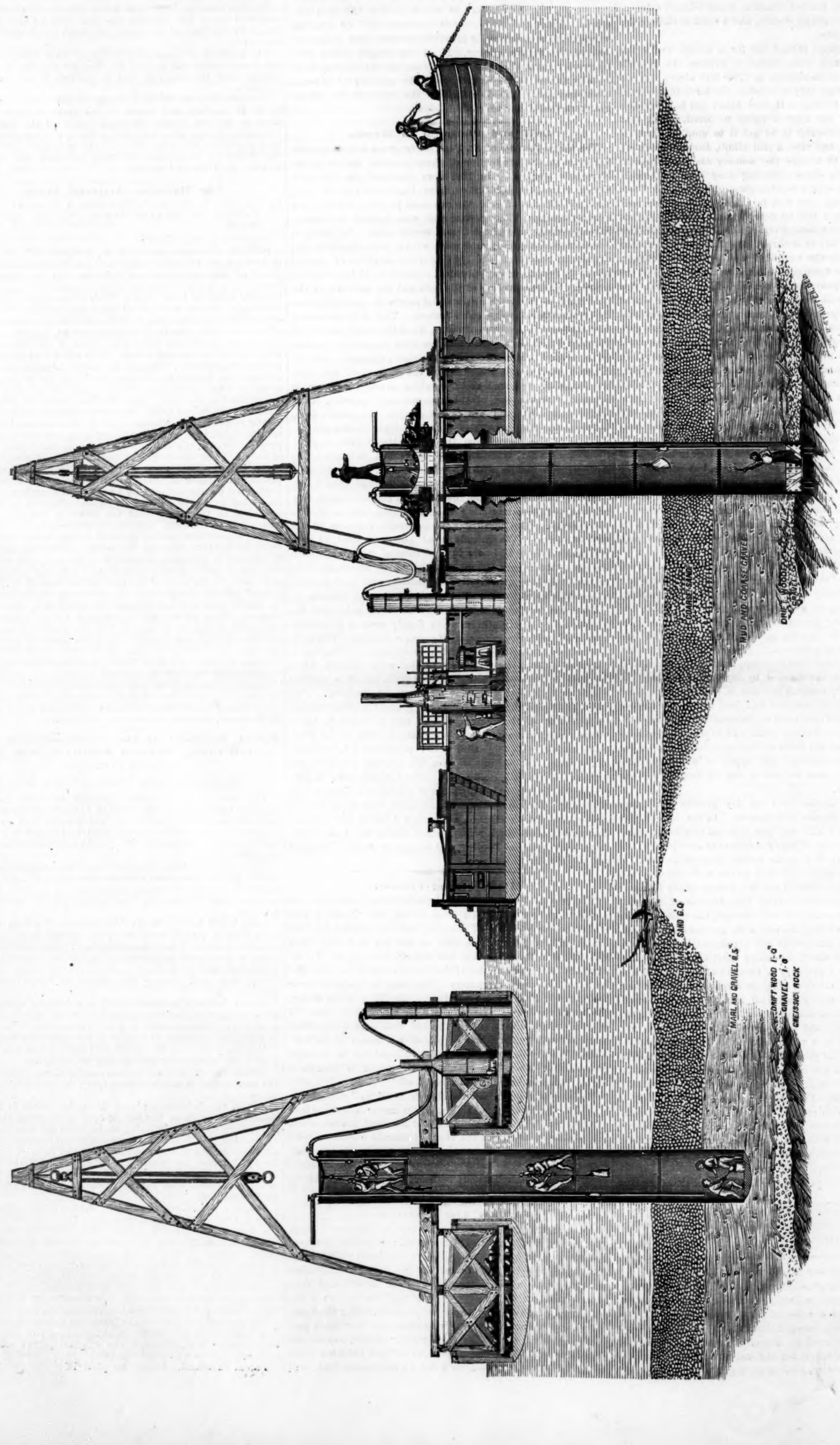
The notoriety or use of the patented invention, after the first application and prior to the reissue, will not render such reissue void, although the original patent issued on such application was wholly invalid.

Patent sustained. Decree for plaintiff.

PNEUMATIC MACHINERY FOR BRIDGES.

The engravings accompanying this article, for which we are indebted to the *Railroad Gazette*, represent the appliances used by J. W. Murphy, engineer, in sinking, by the Plenum pneumatic process, the iron cylinders which form the piers of the bridge now being built, over the Schuylkill river, by the city of Philadelphia. The pier cylinders are made in sections ten feet in length, one and a quarter inches thick, and vary in diameter from four to eight feet; and they are attached together by means of inner flanges and bolts, the joints being made perfectly air-tight.

In order to form a support for these heavy weights while they are being bolted together and placed in position with regard to line and distance, two canal boats, strengthened by bracing, are used as shown in longitudinal and cross section, in Figs. 1 and 2. These boats lie parallel to each other, distant about fifteen feet, and are firmly moored. Stretching across the opening between the boats are heavy clamps, made of strong beams, which are so arranged as to be drawn together or forced apart by iron rods. Between these clamps



PNEUMATIC MACHINERY FOR SINKING PIERS OF SOUTH STREET BRIDGE, PHILADELPHIA; DESIGNED BY J. W. MURPHY, C. E.

the sections of the column are placed by means of the large four-footed derrick. Each section is held, by friction caused by tightening the clamps by the rods, until the section which is to be next above it is placed in position and bolted. The clamps are loosened and the column allowed to slide down until the second section occupies the place of the first, and is tightly clutched. This continues until the bottom edge of the column is within a foot or two of the mud. The boats are then placed in their final position, the clamps loosened, and the entire column allowed to settle into the bottom of the stream as far as the weight of the metal will carry it.

The air lock which caps the cylinder consists of two heavy cast iron circular plates of the same diameter as the column. One of these plates makes a floor to the lock chamber, and the other, the roof, while the sides are formed by the interior surface of the cylinder itself. The diaphragms are held in place by the same bolts that unite the two upper sections of the column, and are pierced with central trap doors which fit tightly and open downwards. Openings are also made for the air supply pipe shown on the left of the lock in Fig. 1, the water exhaust pipe shown on the right of the lock in the same figure, and the equalizing pipes occupying a central position between the two in the engraving. When the column is allowed to slide through the clamps, the water of course rises within it to the normal level of the river. Before workmen can enter, this must be expelled and kept out.

Air is compressed by means of a Burleigh compressor, and is forced into the storing reservoir shown immediately to the left of the cylinder in Fig. 1. Thence it passes through the air supply pipe, and enters the column immediately under the floor of the air lock, the door of which is tightly closed. The pressure thus brought to bear on the water forces it out from under the lower edge of the cylinder; or, in case the bottom of the column is sunk in a stratum of mud impervious to water, the contents are expelled through the water exhaust pipe, out over the top of the cylinder. The men now enter the air lock, close the upper door, open the equalizing pipes, and allow the compressed air to enter the chamber until the density of the atmosphere therein is the same as that in the cylinder below. They are then enabled to open the door in the floor, and to descend to the bottom of the cylinder by means of a rope ladder. Excavation then goes on, the material being hoisted in bags which are heaped against the sides of the air lock until the time of duty of the workmen has expired. The men then enter the chamber, shut the lower door, and allow the compressed air contained to escape, so that the upper trap may be opened and the material removed. Another gang of workers then enter, and the operation is repeated.

As soon as the digging reaches the lower edge of the column, a sink is formed by cutting off the air pressure and allowing that already in the main cylinder to escape by the equalizing pipes. The water then rushes in, loosening the soil at the bottom, and the column, being no longer buoyed up, sinks of its own weight still deeper into the mud. The water is then forced out again, and work goes on as before.

To overcome the tendency of the cylinder to rise, caused by the strong upward force of the compressed air against the diaphragms, the clamps before mentioned are fastened directly to it and, at the same time, support a mass of stone of sufficient weight to counterbalance the lifting pressure. When the column has reached the bed rock of the river, the latter is chiseled to a level bearing, and the cylinder bolted thereto by heavy iron brackets which go completely around its inner circumference. The interior is then filled with rubble masonry laid in hydraulic cement. The first ten feet of this work is done under pressure, after which the work is continued with the diaphragm doors open the same as if it were an open wall.

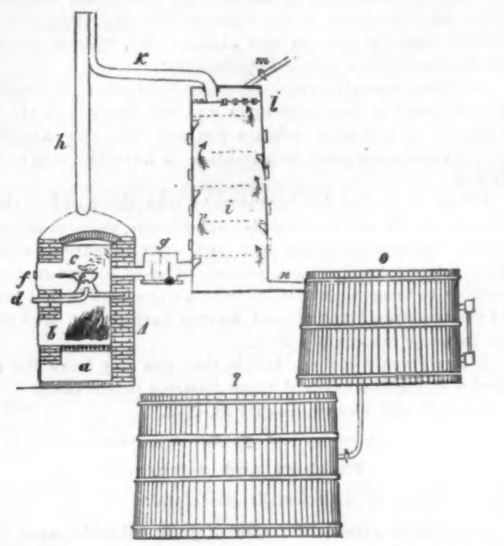
The columns are finally brought to a level by extra sections cast after the total lengths to the rock is ascertained, and are braced together outside by I beams and tie rods. Timber crib work, filled with stone, protects them from passing vessels and the flow of ice.

THE USE OF SULPHUROUS ACID IN DISTILLERIES.

The discovery that mashes, especially mashes of Indian corn, rye, and wheat, yield more alcohol when treated with sulphurous acid than when merely treated in the ordinary way, is due to the brothers Fleischmann, of Olmütz, Austria, and was made in 1860. The starch granules in the grain are, as is well known, inclosed in integuments which are only partially broken by grinding, so that only part of the amylum is thus exposed. In order to overcome this difficulty, it has been suggested to steep the flour in water. However, it was found that steeped flour soon becomes sour, especially in warm weather, so that, in the process of mashing, less sugar was formed than heretofore. Here the preserving quality of sulphurous acid suggested itself. It was found that it acts by dissolving the husky coverings of the granules, and that it alters the fermentation of the corn in such a manner that the mashes never flow over in fermentation. Moreover, the formation of lactic and acetic acid, which always causes a loss of alcohol, is entirely prevented by the use of sulphurous acid gas. And, what is also an important item, the gyle tun need not be so constantly scoured and washed. Sulphurous acid gas is readily absorbed by water, which accordingly increases in specific gravity, so that its strength may be determined by the saccharometer. Formerly sulphurous acid was produced by heating a mixture of charcoal and oil of vitriol. The latter loses thereby part of its oxygen, which combines with the carbon, while sulphurous acid escapes in a gaseous form. When used in distilleries, it was prepared in a vessel lined with lead and conducted into the contents of the mash tun; but, as the process was expensive and troublesome, it was suggested that the gas be produced by burning roll sulphur and passing the smoke into water.

In the last number of the *Practische Maschinen Constructeur*, L. Krupski mentions an apparatus which is used for this purpose, of which the following is a description:

A is a brick or cast iron furnace, consisting of three compartments: *a*, the ash pit, and *b*, the fireplace, covered with a cast iron plate; *c* has a hearth on which the vessel containing the sulphur is placed, all being provided with suitable doors. There is a bent cast iron pipe, *d*, passing through the wall of the furnace and the hearth plate. In compartment *c* there is a flat cast iron pot, with a socket in its center. Pipe,



USE OF SULPHUROUS ACID IN DISTILLERIES.

d, and socket, *e*, serve to carry air into the burning sulphur. Moreover, the door is provided with a two inch air hole, *f*, with a slide to regulate the access of air. This compartment is arched over with brick. The smoke ascends through *h*. From *c*, the sulphurous vapors pass into compartment *g*, which is divided into four divisions by cast iron plates, so that the sublimed sulphur may deposit itself instead of being carried over into tower, *i*. From *g*, the gas passes into tower, *i*, consisting of five compartments, formed by perforated projections, which may either consist of wood, cast iron, or sheet lead. These projections are placed alternately on either side, but there is room left for the sulphurous vapors, which escape through pipe, *k*. In each compartment of the tower, *i*, there are windows four inches square, opposite each other. They serve for the purpose that the ascending of the gas may be observed. In the top compartment there is a division, *l*, which is provided with holes of the size of goose quills, in each of which a pointed stopper is inserted. The space formed by the division, *l*, serves for the reception of the water, which passes through pipe *m*. The stoppers serve to regulate the influx into the tower; but this arrangement may also be replaced by a rose.

The operation is commenced by placing the necessary quantity of sulphur in pot *c*; the fire is now lighted, and the sulphur is liquefied and inflamed. From the bottom of the column or tower, *i*, pipe *n*, leads into reservoir, *o*, which is provided with a gage, and thence the water impregnated with the sulphurous vapors flows into the gyle tun, *q*. The tower or column is eight feet high and two and a half feet wide, the distances between the projections are one and a quarter feet, with the exception of the division, *l*, the distance of which from the cover is only three quarters of a foot. The tower consists of pine wood staves, and is wider at the bottom. The hight to which the vapors have ascended in the tower, after the sulphur is lighted, may be recognized by looking through a window and holding a light before the opposite one; in this case, a nebulous light will be noticed. The flow of water may be regulated by loosening the stoppers more or less, and its quantity may be ascertained by the glass gage of the reservoir, *o*. For one and a half pounds of sulphur 200 quarts should be let in, and the flow should take ten minutes' time. If the sulphur is consumed, a new portion is placed in the pot, but in the meantime the stopcock of the pipe, *m*, is closed. For 5,340 pounds of wheat flour, about five pounds of roll sulphur are required. Indian corn requires one third more, but one pound is sufficient for 540 pounds of potatoes. Rye or wheat malt are steeped while the sulphurous water is cold, covered, and left for twelve hours; then steam is introduced and the mashing machine is set in motion. Indian corn requires twenty-four hours' steeping, but potatoes may be mashed at once. It is proper to retain from potato mashes a portion of the sulphurous water for the cooling vat. Indian corn will yield 20 per cent, rye and wheat 15 per cent, and potatoes 10 per cent, more alcohol if treated by the process above described.

NEW COLORING MATTER DERIVED FROM ANILINE.—Safranine is the substance referred to; it is prepared by heating a mixture of 2 parts of nitrite of aniline with one part of arsenic acid for five minutes at a temperature of from 80° to 120°, then throwing the mixture into boiling water, and neutralizing with lime. The liquor turns a fine red color, and after standing for some time, it is filtered through linen, precipitated by salt, filtered, drained and pressed, when it is ready for market. The nitrite is formed by passing nitrous acid gas through an aniline solution.

"GREENBACKS" AND POSTAGE STAMPS.

NUMBER II.

Thus far we have traced the manufacture of postage stamps and bonds, notes, and fractional currency together, but from this point the processes differ. We shall first follow the greenbacks to their final dispatching to Washington, and then return to the completing operations on the postage stamps. After the last mentioned counting, the bills, that is the large ones, of a dollar and over, are sent to the numbering room. Here are ingenious machines which stamp upon them the red numbers denoting series, etc. The apparatus consists essentially in a number of disks on the surfaces of each of which are raised the ten digits. These disks are placed vertically side by side and so moved by the foot of the operative that a revolution of the right hand disk rotates the one to the left of it a distance equal to that between two numbers on its periphery. This actuates in a similar manner the next disk, and so on to the last. Thus the right disk counts units, the next tens, and thus up to whatever number is required. An ingenious device inks the figures, and a pressure of the treadle brings the combined disks down upon the note. Then, as the latter are raised, the right hand one turns one figure ahead, and so the bills are numbered in regular order, the entire work of the operative being to feed them in and move the lever. This complete, the currency is made into packages and forwarded to the Treasury Department where it receives the well known red stamp; and if it belongs to a National Bank, it travels on to its place of issue, there receiving the signatures, etc. Of course, in cases where the company merely print the back of the note, this numbering process is omitted, it being done by the parties printing the face.

HOW POSTAGE STAMPS ARE GUMMED.

To return to postage stamps. As soon as they emerge from the hydraulic press, they are gummed. The paste is made from clear starch or rather its dextrin, which is acted upon chemically and then boiled, forming a clear, smooth, slightly sweet mixture. Each sheet of stamps is taken separately, placed back up on a flat board, and its edges covered with a light metal frame. Then the paste is smeared on with a large whitewash brush, and the sheet is laid between two wire racks and placed on a pile with others to dry. Great care is taken in the manufacture of this paste. We are informed that it is a common affair for the company to receive complaints from persons, asserting it to be poisonous and that they had been rendered ill by it. These became so frequent that an analysis was made by an eminent chemist of this city, which conclusively proved the paste to be perfectly harmless. Several other absurd ideas on the same subject have been broached. A would-be inventor recently gravely proposed to manufacture the paste into a kind of confectionery, giving it some flavor, so that postage stamps would be sought after as a kind of bon-bons and their sale thereby largely increased.

After the gumming, another pressing in the hydraulic press follows. Then more counting—in fact, to save space, we may note here that stamps are counted no less than thirteen times during their processes of manufacture. The sheets are then cut in half, each portion containing 100 stamps, this being done by girls with ordinary hand shears.

HOW POSTAGE STAMPS ARE PERFORATED.

Next follows the perforation. To understand this process, the reader must imagine two cylinders placed horizontally above each other. Each is divided vertically into several parts and each section is surrounded by a narrow raised band. There are as many of these bands as there are dividing spaces in a perpendicular line between the stamps. Each ring on the upper cylinder is covered on its surface with projections which are very small, very close together, and cylindrical in shape. On the bands of the lower cylinder are indentations, into which these projections accurately fit. In short, the projections and their corresponding sockets make a series of little punches and dies which cut out round bits of the material placed between them. The object in making the cylinder of movable pieces is to allow the distances, between the lines of perforations, to be altered at pleasure. In front of the cylinders is an endless belt on which the sheet of stamps is placed and is thus carried directly between them. As the paper passes through, the perforations are punched, and a simple appliance detaches it from the cylinders. The perforations are first made in a perpendicular line, and then afterwards in a horizontal line by passing the stamps through a similar apparatus differently adjusted. Another pressing follows—this time to get rid of the raised edges on the back of the stamps made by the dies, and this ends the manufacture. A separate apartment is devoted to the packing and sending off the stamps to the different post offices, as they are not, as is the case with currency, sent to Washington. The requisition comes from the Treasury Department to the Bank Note Company, who, if the number of stamps called for exceeds 20,000, pack the sheets in large bundles, or, if below that number, enclose them in half bundles and envelopes and send them registered through the mails. After Congress meets and an appropriation is allowed, suitable arrangements will be made for the distribution of the new postal cards. These are made from dies cut in hardened steel for surface printing, a novel and heretofore considered impossible mode of engraving. The lines instead of being sunk are raised like those of an ordinary wood cut, so that the plate may be used in the same manner as type in any printing press. The completed card shown to us is 3 inches by 5¼ inches in size, made from a fine quality of card board and is of a light buff color. A border of scroll work runs around the edge, while in the upper right hand corner is a very handsome stamp, consisting of a head of Liberty en-

circled with stars and surrounded with elliptical scroll work. The denomination is one cent, and the color of the work, a rich velvet brown. The inscription is simply "United States Postal Card—write address only on this side, the message on the other." Below are ruled lines, while the reverse is blank.

To convey some idea of the immense number of postage stamps used: In the space of three months, the National Bank Note Company have made over 143 millions of all denominations, valued at over four million dollars. During the present year, 520 millions have been completed, those made in January numbering 76 millions. 38½ millions have been completed in a week, and 13 millions in a single day. Three times as many three cent stamps are used as of all other denominations combined; after them come the one cent, and then the two and six cent. The last weekly return of the company showed a manufacture of over 14 millions of finished stamps.

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

The Austrian Patent Laws.---Shabby Treatment and Poor Encouragement for American Inventors.

To the Editor of the Scientific American:

Herewith I send you a copy of the proposed law for the protection of new inventions that may be brought to the exposition, and for which patents have not been taken. You will see from the preamble that it has been caused by the article published in the SCIENTIFIC AMERICAN of December 23, 1871, setting forth the difficulties of inventors coming here with their goods, and the want of proper protection. You will at once see that the proposed Exposition-Protection gives no protection beyond the old law, and is simply a deception. It was described to the world through the Austrian press as an adequate protection, when in reality it is a decoy to induce inventors to come here with their inventions before taking out their patents, where their only protection is the old patent law, which is a perfect fraud upon foreign inventors.

In order that you may thoroughly understand the working and rulings of the law, I will give you my experience in a suit, which has now been going on between two and three years and can be continued for ten years if the Patent Office sees fit.

1. All patents must be worked within one year of the date of the issue of the patent.

2. Working before making application for a patent, even if invented in the country, is ruled to be non-compliance with the law.

3. Working a patent between the date of application and date of issue is not complying with the law.

4. Bringing the parts necessary to make a machine or article into the country and putting it together and finishing it in the country is declared to be not manufacturing in the country, according to the law. All of the parts are required by the Patent Office to be made in Austria. It is expected that a ruling will soon be made that all the materials, from which the machine or articles patented are made, must be products of the country.

5. The Patent Office has issued special instructions to its subordinates requiring them to exact the working of all foreigners' patents with the most rigid exactitude.

6. They require sworn proofs that a patent has been worked exactly in conformity with the drawings and specifications thereof. (Patent drawings are very seldom intended for working drawings).

7. If there be a native infringer in the case, there is no end to the number of times you may be required to prove the working of your patent, as the law is so flexible that there is no limit to the number of times it can be demanded; and it is extremely difficult to prove the working to the satisfaction of the Patent Office, even when the article has been invented in the country, and is continually being manufactured in the country even for a period of three years or more.

8. Under the Austrian law, if two experts decide that an infringer's article is like your patent, you can seal up the machinery and stop the work. In this case, the machinery was sealed up; but, on application of the infringer to the Government, the authorities came forward, broke the seals (without any law to sustain them), and thus destroyed the only means of coming to a decision under the Austrian law. Unless a patentee seals up the infringer's goods or machinery, there is no provision in the Austrian patent law by which a suit can be brought to an end. My suit, which has now been going on over two years, has been decided twice in my favor, but immediately (on petition of the infringer to the Patent Office) the case is opened again on the pretence of other testimony, when not a particle of testimony against the invention has been produced. The whole effort of the infringer and the Patent Office is to try to make out that I have not properly worked my patent. My attorney tells me that they can keep on opening the case and demanding that I shall make new proofs of working as long as they can get the Patent Office to grant their request; and he says that the Patent Office always favors the infringer, especially if the patentee be a foreigner. The only mode of getting a decision is by the seals, which is similar to an injunction with us. What can be expected when a Government violates its own law?

9. If an inventor allows two years to pass, after working his patent in the first year without working it again, his patent becomes void.

10. The experts employed in all cases of enquiry, as to an infringer's article being an infringement of a patent, are from the Polytechnic School. My case has been reported on by them three times (and always in my favor), and once previously by two experts who sealed up the machinery; and now the Patent Office has ordered it to be returned again to the Polytechnic School with questions to induce them to change their decision; and I am not allowed to know what those questions are until the day of decision. In addition to this, the papers were sent to the Artillery Committee of the Government to see if they could not furnish proof to destroy the patent; they were kept by them for nearly three months without any notice to me or my attorney.

I have never heard of an American who has succeeded in getting a decision in his favor in this country. Nearly all patents are destroyed by the working clause and the taxation; for an inventor to take a patent here and undertake to comply with the laws, as now administ red, without coming to the country is a simple impossibility.

Austrian manufacturers never hesitate about infringing patents; and if you go to them and tell them they are infringing, they simply ridicule you and tell you Austrian patents are never good for anything. I have had this experience.

I think it is time for inventors to take the position that, if there are to be international expositions, there must be a trifle of protection to the men and their inventions which give interest to these expositions. One of the greatest objections to bringing inventions to this exposition is that none of the countries lying around Austria have patent laws that an inventor can comply with.

I have given you these details that you may know the actual working and effect of these Austrian patent laws.

Grand Hotel, Vienna, August 28, 1872. ***

Theology and Science.

To the Editor of the Scientific American:

I have been a constant reader of your valuable paper for more than 15 years, and was highly gratified to see the boldness in your editorial on "Science and Theology" in your issue of September 7, 1872. And all untrammeled thinking readers here (to whom I showed the article) thought it well written, and a fair statement of the facts.

That theologians have, in times past as now, been stumbling blocks in the way of science is simply a historic fact. That men professing Christianity made discoveries in opposition to what the theologians of their day held as truth is also well known. And that men who advanced any other theory, either in theology or science than that the ruling Christians held as truth, were persecuted, tortured, or put to death is a matter of history. That Virgilles was put to death by the Church—because he held that the earth was inhabited by people on both sides—is also a matter of history.

Copernicus was sentenced by the Church for heresy; and but for his death in a few weeks, he too, no doubt, would have suffered the same fate as did Galileo for the like discoveries which he subsequently set forth. Even the inspired Martin Luther said to his people: "This day we are advertised that a new astrologer has arisen, who presumeth to prove that the earth goeth about (like one riding in a carriage), and not the firmament" (which they believed to revolve while the earth was stationary). "Yea, trees and all; thus we give ourselves up to our foolish fancies and conceits. This fool Copernicus will yet turn the whole art of astronomy upside down." (This last sentence was prophetic, no doubt)." But the Bible teaches us another lesson, for Joshua prayed that the sun should stand still, and not the earth."

In the fifteenth century, the learned divines at Salamanca, in Spain, also condemned the project of Christopher Columbus as being heretical, and they claimed that the earth was fixed and could not be moved, "that no one could pass beyond the uttermost parts of the sea" or "border of the waters," where, the Bible said, "the Lord laid the beams of heaven and then stretched them out like a curtain, and formed them into a tent wherein to dwell." Poor Columbus could get neither encouragement nor means from the church, as theology opposed the idea of a round and revolving earth. It is sheer nonsense for any intelligent mind in this intelligent age to maintain either past or present orthodox theology as having any footing either in history or science.

The greatest age of human antiquity (if theology is true) as maintained to day is less than six thousand years, beginning in the days of Adam and Eve. Yet the Chinese records in astronomy go back twenty thousand years. The eclipses and conjunctions of planets in the days of Fedo—10,000 years ago—have been recalculated by Baily and other astronomers, and they have mathematically demonstrated the truthfulness of the Chinese astronomical records—showing a difference of time of but 51 seconds.

There are none but cowards who, for policy's sake, to-day allow their better thoughts to be crippled and trampled upon by the popular dogmas, which yet hold our struggling nation in chains of mental slavery. For freely expressing their opinions, men should have the honor and respect of every progressive mind, whether they cater to the old established and rusty dogmas or not. It is by the free expression of our thoughts that truth is developed. Open your ears first and listen, then open mouth and speak. This, to day, is a free country. The said editorial I much admire, as will thousands of others. I have been a scientist and theological student for some twenty years. I seek truth, not to cloak any special among idea under, and the thousand various opinions as to what theologic truth is.

As to the scientific facts of the day, we have no divisions of sects, which only exist as to some abstract points which are minor, and on which the evidence is not fully demonstrative. But in theology, let any one demonstrate any point or doctrine now held by the same rule as is demanded in science, and see where he will land. Schisms in theology are numerous, in science, few; hence let science be made the standard of truth, and let it sit in judgment.

Jackson, Mich. G. NEWCOME, M. D.

Cider versus Juice.

To the Editor of the Scientific American:

Cider machines, cider mills, cider presses, or whatever else may be the correct term for the apparatus employed in manufacturing cider, are certainly in great request this year. It is a pity that there is not a single really good and reasonably priced machine in the market, one that performs its work rapidly and thoroughly, producing cider equal in quality to that produced by the old time "New England cider mill."

There is no use in arguing about the respective merits of the different kinds of patent cider mills. Many of them are convenient; they save time, labor and annoyance, but not one of those that I have seen produces cider which can favorably compare, in purity, color, or flavor, with that manufactured in the good old tedious way by pressing through straw. I hear it said day after day that an ample fortune certainly awaits the lucky inventor of a cider machine which, in one operation, will crush or grind the apples and force the juice out of the crushed mass, in a thoroughly clean and effective manner. I take issue with the advocates of this idea. I maintain that there is a difference between cider and juice, and that for the purpose of manufacturing good, sweet cider, the juice of the apples must mingle with and be in contact with the crushed apples (pomace) for a certain space of time, neither too long nor too short, before it is separated therefrom. Consequently a machine which, in one rapid effective operation, would crush the apples and expel the juice therefrom could not produce properly colored, good, sweet cider.

Am I right or wrong? I should much like to have the contested point settled in a scientific and conclusive manner, through your columns, either by yourselves or by some one of your numerous erudite contributors.

Jacksonville, Pa. E. H.

Milk Sickness, its Causes and Cure.

To the Editor of the Scientific American:

There has scarcely been anything in diseases which has so completely baffled the investigation and skill of the physician as milk sickness; and I have for five years contemplated calling attention to this subject. I lost a brother in June last by this dreadful poison known as milk sickness, and I feel prompted to give a few facts relative to its cause and cure.

Milk sickness is caused by a vegetable poison, and this has been substantially authenticated by a great number of instances coming under my own personal knowledge.

I am having the plant analyzed and I send you a small bundle of it. The specimen I send you was taken from the woods in Miami county, Ohio, where milk sickness is very prevalent. In a neighboring county, three, four, or five persons have died in one family in a season. This poison is a species of the *rhus toxicodendron*, or probably it may belong to *trifolia latifolium* or *trifolia recumbens;* it is found in many of the Northern States among certain growths of timber, and it exists in a wild state in considerable abundance. It is always found where milk sickness exists. I can send you further information, and describe two modes of curing the disease. ORRIN S. MOTE.

Richmond, Ind.

[Our correspondent is taking unnecessary trouble in having the plant analyzed. It is the *rhus toxicodendron*, or poison oak, and its properties are well known. The juice produces inflammation and eruption if applied to the human skin; and the plant itself gives off the poison by volatilization, producing, on persons inclined to erysipelas, an affection exceedingly troublesome, especially when it attacks the face. The vesication will even, in some cases, reach the desquamatory stage, and the face will swell till the features are scarcely recognizable. Saline purgatives and lead water applied locally are among the best remedies. A saturated tincture of lobelia applied to the affected part on a linen cloth has, we believe, done some good, and one well known physician recommends it as a specific. The vesicles have been successfully treated by a subcutaneous application of Monsel's solution (*liquor ferri subsulphatis*.)—EDS.]

Heating and Cooling our Dwellings.

To the Editor of the Scientific American:

Reading an article in your issue of September 14, 1872, I am prompted to offer the following as a more practical and efficient plan, to obtain a mean temperature and a healthy circulation of air in our buildings, than the one offered by M. D.

At the time of erection (or afterward), tunnel or excavate from the basement, 4 feet below surface, any distance practible from the dwelling; brick this tunnel or lay an iron tube of proper size, and connect it to an air chimney (the higher this chimney, the purer the air, and the greater the distance from the building, the greater the modification of the heat); connect a small tube, leading to each room, to this air passage at the basement, and direct as may be desired for heating purposes. This simple plan will not require any rotary blower or the extra expense of an engine, if the flues and passage ways are arranged properly in the building, and with a greater elevation than the top of the air chimney. The air passing under ground in this manner will be pure and cool in summer, and the cold will be modified in winter; and the method will save a great per cent of fuel during the months of the latter. EGBUD.

A Model Manufacturing Village.

B. G. Northrop gives the following interesting particulars concerning the Fairbanks Scale Works, in a recent letter from St. Johnsbury, Vt. to the *Christian Union*:

Here is a great manufactory of scales, by far the largest establishment of the kind in the world, employing about six hundred men, and nearly four hundred in branch departments elsewhere, and manufacturing over 50,000 scales annually. They are of all sorts and sizes—over three hundred varieties—from the most delicate standard of the druggist or banker, to the ponderous hay, railroad car, or canal boat scales, weighing 500 tuns at a time. They are adapted to the standards of all nations, and marked with the signs of each. This week a large invoice was sent to Japan, and for a long time they have been sold in China, Australia, India, Persia, Turkey, Arabia, (where they have been carried on mules' or camels' backs), in the Barbary States, Cape Colony, Sandwich Islands, Isle of France, all the South American States, and still more largely in the great commercial nations of the earth. The yearly sales amount to about $2,000,000, and the demand is rapidly increasing. The business was never so prosperous as during the present season.

It has long been a marvel how such a concern could be made a permanent success for nearly fifty years in this remote corner of the State, so far from tide water, and with heavy and expensive freightage.

Now, what is the explanation of this marvelous prosperity? What is the condition of the workmen? These points I came here to investigate. For this purpose I inspected the works (covering ten acres), examined the processes, talked freely with the hands as well as with the owners and with the citizens of St. Johnsbury not connected with the factory. To observe the home life of the operatives, I entered their houses and conversed with their families.

This company maintains the highest reputation for integrity. Many names honored abroad are tarnished at home. Only the strictest honesty and fair dealing can stand the test of daily business intercourse with hundreds of hands for nearly half a century. "They do everything on the square" was, in substance, the answer of many citizens and workmen to my inquiries on this point. The company has fairly earned and gained the confidence of their men and of this entire community, and a good name at home naturally follows them everywhere. The workmen say that they are never permitted to do any sham work, even for the most distant market. To quote the pithy phrases of the men, "no shoddy here," "no veneering," "no puttying." The "test room" illustrates the thoroughness of their work. To avoid jar of machinery or movement of the air, all the scales are subjected to the nicest tests before being "sealed." The minutest films of metal are used for the more delicate trials. Masses of iron, weighing hundreds of pounds, are placed alternately on the different corners of the railroad scale platform, and if the difference in position changes the "record," the scale is condemned. The thoroughness of the work and this severity of the test is the explanation of the world-wide reputation of the Fairbanks scales for accuracy.

There is a superior class of workmen in this establishment All are males. Their work is proof of skill. Their looks and conversation indicate intelligence. They are mostly Americans, and come from the surrounding towns. More than half of them are married, and settled here as permanent residents, interested in the schools and in all that relates to the prosperity of the place. Many of them own their houses, with spacious grounds for yard and garden, and often a barn for the poultry and cow. These houses are pleasing in their exterior, neatly furnished, and many of them are supplied with pianos and tapestry carpets. The tenement houses, also, are inviting and comfortable, and surrounded with unusually large grounds. The town is managed on temperance principles, and drunkenness, disorder and strife among the hands are almost unknown.

I examined the pay roll and found the wages very liberal. The workmen seem well satisfied on that score. Wherever it is possible, the work is paid for by the piece. The work itself is largely done by machinery, and that *sui generis*, invented here and for the special and peculiar results here reached. The men are encouraged to expedite their processes by new inventions, and they share largely in the benefits of all such improvements. Paying by the piece has worked well here. This plan stimulates industry, promotes skill, and fosters inventiveness. It apportions rewards to the quantity and quality of work done. But more than all, this plan is recognized by the men as just and satisfactory. With the time left practically to their own choice, there is no eight hour movement here. No labor league or union has ever existed—no strike ever been suggested. This would be a poor place for the "internationals" to preach the gospel of idleness or agrarianism.

There has evidently been mutual sympathy and interest between employer and employed. Governor Fairbanks, one of the founders, used to say to the men: "You should always come to me as to a father." He maintained relations of kindness with them, visiting the sick, helping the needy, counselling the erring, encouraging their thrift, enjoining habits of economy. He taught them that it was their interest and duty to "lay up" something every month, and that the best way to rise in the social scale was to unite economy with increasing wages. The fact that so many of the workmen are "forehanded," besides owning their homesteads, is due to his teaching and example. The worth and dignity of work, he illustrated in theory and practice. The notion that labor was menial, or that the tools of trade or farm were badges of servility, he despised. His sons worked in the shops and thoroughly learned the trade. The brothers of the Governor were in full sympathy with him, and the same spirit characterizes the sons and the surviving brother who now manage the concern. There is still the fullest and happiest conciliation between labor and capital. It is not strange that the workmen "hold on." Their permanency is a striking fact. Many have been here from twenty to forty years. I conversed with one man over seventy years of age—a foreman—who has worked here "from the start," forty-three years.

Years ago the men were aided in forming and sustaining a lyceum, and liberal prizes were offered for the best essays read. Recently, Horace Fairbank has founded a library and opened a large reading room, free to all. The Athenæum containing the library, reading and also a spacious lecture hall, is an elegant structure, 94×45 feet two stories high. The books, now numbering 8,300, are choice and costly. Having visited nearly every town of Massachusetts and Connecticut, and traveled widely in this country, I have nowhere found in a village of this size an Athenæum so costly, a reading room so inviting, and a library so choice and excellent as this. These various provisions for the improvement, happiness and prosperity of this people, coupled with liberality and fairness in daily business intercourse, explain the absence of discontent and the uniform sympathy, good feeling and harmony which prevail.

I have nowhere seen a better practical solution of the labor question.

Transparent Stereoscopic Pictures upon Paper.

M. A. De Constant, writing in a recent number of the *Photographisches Archiv*, describes a method which has been frequently employed by him for some time past for preparing photographic transparencies upon paper. The pictures produced may be employed for a variety of fancy purposes, and are very suitable for stereoscopic productions. His manner of proceeding, he briefly describes as follows:

"Some thick albumenized paper is chosen for the purpose, which has previously been well sized. This is sensitized in the ordinary manner, and, after drying, printed under a negative in the pressure frame, the face, or albumenized surface, of the paper being turned away from the negative, and not placed in contact with the negative film as usual. The printing operation must be carried on rather longer than when the face of the paper is being printed, so that an exceedingly vigorous picture is produced. The depth of the print can only be correctly judged by an examination of the paper by transmitted light, as the image is formed in the body of the paper itself, and not simply upon the surface of the reverse side of the sheet.

"The coloring of the picture is also proceeded with on the reverse, and not upon the albumenized face of the paper, and for this reason the laying on of the colors is very much simplified. The water colors of Newman, or any others, may be used for the purpose. No spots or patches are produced, for the tints spread uniformly over the paper.

"This process I have now employed with much success for a period of ten years, and have applied the pictures produced to several purposes. For lamp and other transparent screens they are especially suitable, forming handsome ornamental productions of this nature."

Wheatstone's Patent Magnetic Counter.

This instrument has been devised for the purpose of counting and registering the periodical motions of any machine, whether rotary or oscillating. It may be applied either near or at any distance from the machine whose motions are to be registered. It is less cumbrous than mechanical registers, and cannot be tampered with by persons in charge of the machine.

No voltaic battery is employed, the electric currents being produced by a small piece of iron attached to the moving part of the machine, working before the poles of a magnet; it therefore requires no more attention than an ordinary piece of mechanism.

Among the purposes to which this register has been applied are the following:

To count the number of impressions produced by any printing machine.

To count the number of revolutions of a screw or paddle shaft of a steamship.

To count the number of visitors who enter a theater or any public place.

By means of these instruments, also, the rate of working of any number of machines may be seen and compared by the overseer in any distant apartment, without the necessity of visiting the machines themselves.

Woolen Manufactures of the United States.

The complete statistics of the manufacture of woolen goods in the United States, as returned at the ninth census, for the year ending June 1, 1870, have just been sent to press from the Census Office and exhibit the following totals: Of the 2,891 establishments in the United States, there are in Pennsylvania, 457; New York, 252; Ohio, 223; Massachusetts, 185; Indiana, 175; Missouri, 156; Tennessee, 148; Kentucky, 125; Illinois, 109; Connecticut, 108; Maine, 107; Iowa, 85; New Hampshire, 77; West Virginia, 74; Virginia, 68; Rhode Island, 65; Vermont, 65; Wisconsin, 64; Michigan, 54; North Carolina, 52; Georgia, 46; Maryland, 31; New Jersey, 29; Texas, 20; Utah, 15; South Carolina, 15; Alabama, 14; Arkansas, 13; Delaware, 11; Mississippi, 11; Minnesota, 10; Kansas, 9; Oregon, 9; California, 5; Louisiana, 2; Florida, 1; and New Mexico, 1. The capital of these 2,891 establishments is reported at $98,824,531. The number of steam engines is 1,050, with a horse power of 35,900, and water wheels with a horse power of 59,332. The number of sets of cards is 8,366, with a daily capacity of 857,392 pounds of carded wool; number of broad looms, 14,039, narrow looms, 20,144; spindles, 1,845,496. The average number of hands employed during the year has been—of males above sixteen, 42,728; of females above fifteen, 27,682; of children and youths, 9,643. The amount of wages paid to these hands during the year is reported at $26,877,575; the total value of the materials used during the year was $96,432,601, of which the amount paid for chemicals and dye stuffs was $5,833,346. There were consumed during the year 17,311,824 pounds of foreign wool; 154,767,075 pounds of domestic wool; 17,571,929 pounds of cotton; 19,372,062 pounds of shoddy; 2,573,419 pounds of woolen yarn; 3,263,949 pounds of cotton yarn; 1,312,560 yards of cotton warp; 140,733 pounds of warp. The value of all other materials used was $5,670,250.

Among the productions of these 2,891 establishments are 63,340,612 yards of cloth, cassimeres and doeskins, 58,965,286 yards of flannel, 1,941,866 yards of felted cloth, 2,663,767 yards of repellants, 2,853,458 yards of tweeds and twills, 14,078,559 yards of satinets, 5,506,902 yards of kerseys, 24,489,985 yards of jeans, 14,130,574 yards of linseys, 1,932,382 yards of negro cloth. Number of pairs of blankets, 2,000,439; number of horse blankets, 58,553; number of carriage robes, 22,500; number of coverlids, 226,744; number of shawls, 2,312,761; number of pounds of rolls, 8,683,096. Total value of production, $155,405,058.

Tests of Building Stone.

In a paper read at the recent meeting of the American Society of Civil Engineers, Mr. Robert G. Hatfield, architect, of this city, described a machine made by him for practically testing the strength of building materials. It is a platform scale set in a table, and so arranged with hand wheel and gearing as to produce a pressure upon the platform. This pressure is transmitted in the usual manner, by levers on knife edges, to the scale beam. By an ingenious contrivance suggested by Mr. R. F. Hatfield, the poise upon the scale beam, instead of being moved by hand as the pressure is applied, is made to travel by a clock movement, stopping automatically when reaching the point on the beam which represents the pressure upon the platform, thus indicating truly the highest pressure attained.

The following were ascertained by this machine to be the comparative strengths of the several kinds of stone mentioned, being the weight in pounds required to break a bar one inch square and one foot long in the clear between the bearings:

Grewacke, North River, Blue-stone	250·76	lbs.
" Saugerties "	203·64	"
" Brown Grit "	122·31	"
Eastchester Marble	150·77	"
Portland, Conn., Sand-stone	94·	"
Belleville, N. J. "	88·47	"
Dorchester, N. S. "	66·98	"
Marietta, O. "	62·82	"
Berea, O., "	42·35	"
Amherst, O., "	37·22	"
Bricks, North River, Hard	42·74	"
" Staten Island,	42·03	"
" Philadelphia Pressed	41·85	"
" Colabergh	41·52	"
" Perth Amboy	26·36	"

The above were the best results. Some specimens of materials from the same localities exhibited considerably less strength than that here indicated.

How Trees are Killed by Lightning.

All who have examined a tree which has been destroyed by a "thunderbolt" will have noticed not only how the layers of the wood have been shattered and separated into strips, as if full of wind shakes, but also the dryness, hardness, and brittleness of the wood, as though it had been through the process of curing in a kiln. This is attributed to the instantaneous reduction of the sap—the moisture within the wood—into steam. When this moisture is abundant, as in May or early June, the amount and force of the steam not only bursts and separates the layers and fibers, but rends the trunk in pieces or throws off a portion of it, down a line of greatest power or of least resistance. And when the amount of steam thus suddenly generated is less, owing to the drier condition of the stem from continual evaporation and leaf exhalation, there may be no external trace of the lightning stroke; yet the leaves will wither in a few days, showing that the stem has been rendered incapable of conveying supplies, and the tree will either partially or entirely die. Still lighter discharges may be conducted down the moist stem, without any lesion or hurt.—*Building News*.

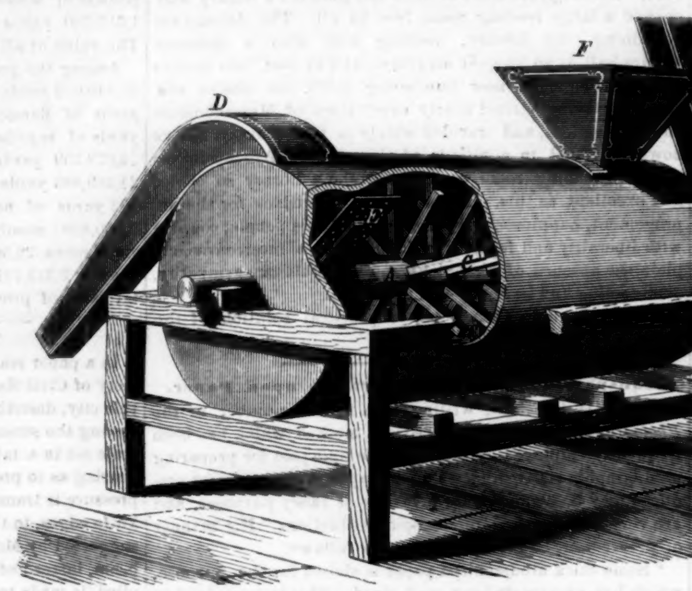
ONE of the most popular of the papers read, at the late meeting of the British Association, was one on the "Higher Education of Women," by Miss Emily Shirreff. Schools were wanted, she said, which would effectually banish that flimsy teaching, that substitution of ill-taught accomplishments for solid knowledge which called down the severe censure of the Schools Inquiry Commissioners, and should be placed beyond the control of parental caprice and the freaks of fashion.

Two measures of hydrogen always combine with one of oxygen. Oxygen is sixteen times heavier than hydrogen, and it therefore follows that one part by weight of hydrogen unites with eight parts by weight of oxygen. Whenever chemical action takes place, a similar definiteness and invariability is observed in the quantities concerned. Eight parts by weight of oxygen, for instance, will always combine with 32 of copper, with 103 of lead, or with 100 of mercury; and 100 of mercury will always combine with 16 of sulphur, with 80 of bromine, or with 127 of iodine. It often happens, indeed, that two elements will combine, under suitable conditions, in more than one proportion; but even in these cases the higher proportions always bear a simple numerical relation to the lower ones.

COFFEE WASHING MACHINE.

In our illustration is shown a new device designed to be used for removing the mucilage and other matter adhering to the coffee beans, previous to drying them or preparing them for use or transportation. A cylindrical vessel is supported in a slightly inclined position on a suitable frame. Within the former is a shaft, A, the ends of which have their bearings either on the heads of the cylinder or on the frame as shown in the engraving. This shaft is rotated by means of a pulley, B, which communicates with suitable machinery. Within the cylinder and projecting from the shaft are radial beaters, C, while in line with the spout, D, through which the washed coffee emerges, is also attached the shaft, a series of blades, E. The coffee to be washed, together with some water or other liquid, is poured into the hopper F, through which it passes into the cylinder. There it is subjected to the action of the beaters, which, rapidly revolving, remove all mucilage and other matter not required in connection with the bean. The coffee descending the slight incline of the apparatus is at length discharged by the action of the revolving blades, E, through the spout.

This invention was patented July 16, 1872, through the Scientific American Patent Agency, by Mr. José Guardiola, being one of a number of inventions by the same inventor of appliances used in manufacturing sugar and treating coffee for market in Guatamála. For further information, address care of Ribon & Muñoz, 63 Pine street, New York, or care of J. C. Merrill & Co., 204 California street, San Francisco, Cal.

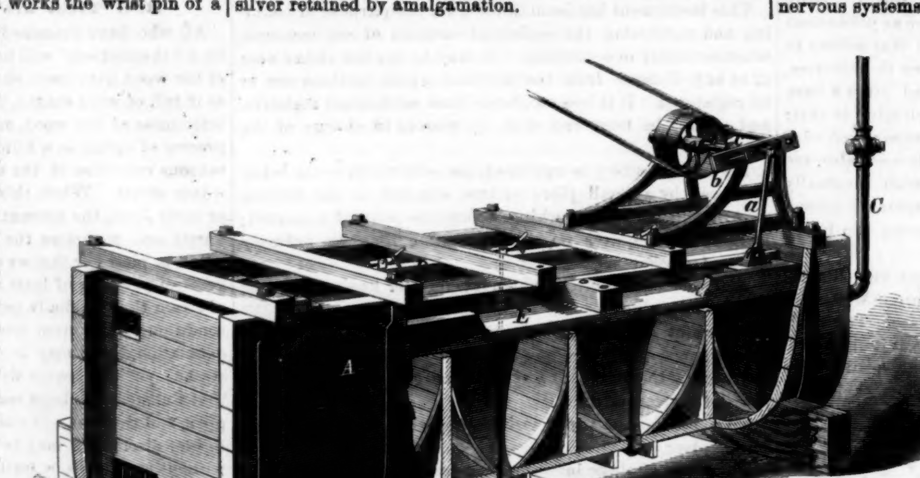


GUARDIOLA'S COFFEE WASHING MACHINE.

IMPROVED ORE SEPARATOR.

In the device shown in our illustration, technically termed a continuous one plunger jig, the principle involved is the separation of ores in water, in contradistinction to the ordinary dry process. The apparatus is claimed by its inventor to combine many of the best points of similar machines in use in Europe, together with improvements of his own, the mechanism of the whole being so combined as to render it simple, effective, cheap, and easy of repair.

A, in the illustration, is the trough in which the sieves, four in number, for effecting the separation, are arranged. This vessel is of suitable length, with a nearly semi-cylindrical bottom, and is rendered stationary by suitable fastenings to the supporting frame, B. It is supplied with water by the pipe, C, which communicates with its interior by an inwardly closing valve. The upper part of the trough, A, contains a longitudinal partition, D, which, however, does not reach entirely to the bottom, serving merely to separate the plunger, E, on one side from the sieves on the other. The plunger is a flat piece of wood or plate, pivoted at one end to the vessel while its other end is, by a pitman, *a*, connected with a slotted lever, *b*, in the slot of which works the wrist pin of a crank, *c*, on the operating shaft, F. The plunger is, therefore, vibrated up and down, its upward motion drawing the water in through the pipe, C, and down through the sieves; while in its descent it shuts the valve through which the water enters, forcing the water in the trough up through the sieves. In order to make the latter motion the quicker of the two, the wristpin of the crank, *c*, is nearer the pivot of the lever, *b*, when swinging the same down, and further away from the pivot when raising it up. At the end of the last sieve and between every pan, are transverse partitions which divide the trough into separate chambers for the collection of the several kinds or grades of ore, each partition being only sufficiently recessed on top to permit the necessary vibration of the plunger. The motion of the latter being greatest near the shaft, a larger amount of water is forced through the first sieve than through the next, and so forth. The bridges between the sieves are made sharp ridged so as to offer as little resistance as possible.



CAZIN'S ORE SEPARATOR.

Special attention is called to the advantage of the single plunger. By the inflowing supply water, which has its outlet from below and through the sieves, the down motion of the water and suspended ore, after receiving the uplift by the descent of the plunger, is partly arrested, and the separation of particles according to their specific gravity thereby greatly facilitated. By the constant stream of clear water from under the sieves, all deposition of refuse material below and on the latter is prevented.

It is claimed by the inventor, who is a practical mining engineer, that this form of ore separation entirely obviates the necessity of concussion hearths, slime hearths, and buddles, thus greatly reducing the expenses of mineral dressing establishments. The working of different sizes of rock is provided for by making the wrist in the crank movable, and also by permitting pulleys to be interchanged. The variation of plunger lift is from one eighth inch to two and a half inches, and the difference in number of revolutions per minute from 120 to 160. The principles governing the adjustment of the machine may be briefly summarized as follows: The lift should be higher as the size of mineral is coarser; the quickness of motion should be greatest for the finest sizes, and the richer the ore, the thinner should be the sieve bed. The inventor states that, in separating metallic mineral or rock according to quality, the action of this apparatus is so complete that in leading a stream of water and particles of rock into the upper sieve, the jig will, without interruption, separate all valuable parts and deposit them in the tank partitions, whence they are removed by working the valves, while the waste rock will emerge from the opposite end. The first sieve will produce the metallic mineral pure and clean, the second sieve serving to catch those portions escaping the action of the first. The result should be daily returned to the first sieve, at a time when the general stream is interrupted, so as to be again submitted to its action. The third and fourth sieves are used similarly to the second, as reserves, or for separating material of less specific gravity than that acted upon by the other sieves.

Another point of advantage claimed is that this machine will save, separate, and thus render marketable the tailings in streams flowing from quartz mills. These are, first, such gold as by the influence of sulphur is coated and rendered unsusceptible of amalgamation; second, the mercury which, becoming finely scattered, has been washed away by the current; and, thirdly, the metallic ores contained in the rock, copper, lead, antimony, nickel, etc., besides the gold and silver retained by amalgamation.

Patented through the Scientific American Patent Agency, July 2, 1872, by Mr. Frederick Cazin, superintendent of the Frumet Lead Mining and Smelting Works, Frumet, Mo., from whom further particulars may be obtained.

To Cut and Bore India Rubber Stoppers.

Dip the knife, or cork borer, in solution of caustic potash or soda. The strength is of very little consequence, but it should not be weaker than the ordinary reagent solution. Alcohol is generally recommended, and it works well until it evaporates, which is generally long before the cork is cut or bored through, and more has to be applied; water acts just as well as alcohol, and lasts longer. When, however, a tolerably sharp knife is moistened with soda lye, it goes through india rubber quite as easily as through common cork; and the same may be said of a cork borer, of whatever size. I have frequently bored inch holes in large caoutchouc stoppers, perfectly smooth and cylindrical, by this method. In order to finish the hole without the usual contraction of its diameter, the stopper should be held firmly against a flat surface of common cork till the borer passes into the latter.—*W. F. Donkin, in Chemical News.*

A Remarkable Volcanic Eruption.

Recent intelligence from the Sandwich Islands is to the effect that on the 13th of August a great eruption of the volcano at the summit of Mauna Loa took place, the light being very bright, as seen from Hilo and Howail. The Honolulu *Gazette*, in its issue for August 28, gives the following particulars, saying:

"Our latest advices from Hawaii inform us that the eruption still continues in Mokuaweoweo, at the summit of Mauna Loa. A column of fire or lava is constantly being thrown up several hundred feet above the summit of the crater, presenting, in the night, a most imposing spectacle. The people living around the base of Mauna Loa are in momentary expectation of a lava flow from the sides of the mountain. When it is considered that the floor of the crater is something like 500 feet below the rim, and that the column of lava is estimated to be thrown something like 200 feet above the rim, it must be thrown up at least 700 feet. The column must also be immense, as it can be seen distinctly from all sides of the mountain, which, in the night, it lights up in grand style. The eruption reached its grandest dimensions about eight days before our informant left the coast of Hawaii, since which time the column of fire had not perceptibly diminished."

Wine a Poor Beverage.

In all our common articles of food the elements of nutrition and respiration are so nicely balanced in their proportions that, for the diet of a healthy man, there is no necessity for adding an extra quantity either to the one class or the other; or, in other words, the supply of nutrition and of animal heat is so admirably equalized in the composition of common food that any material derangement of the proportions which it affords is attended with a corresponding derangement of the vital functions. It is obvious, therefore, that if we add a portion of alcohol to the food taken into the stomach, the elements of respiration are increased and the animal heat augmented in a proportionate degree. No part of the alcohol can go to form the tissues of the body, or to renovate and sustain them, as it is destitute of nitrogen, and not an element of nutrition. It can only serve as an element of respiration, to be burned in the lungs of a man, and to add to the amount of his animal heat. The result is that, as the quantity of alcohol is increased from habit, an unnatural exhilaration is produced, leading to an overtasking of the muscular and nervous systems, and to premature decay in the manhood of the victim. To use a familiar phrase, he has "lived too fast." Let us gain a clearer view of this point by contrast. We know that an insufficient supply of food tends to produce paleness of the cheek, because both the animal heat and the nutrition are less than are demanded to keep up the healthful condition of the system. On the other hand, where age has not indurated the skin, an abundance of food keeps up the vital powers, and the face, possessing the ruddy color of health, bears testimony to a well stored stomach. But when alcohol is added, in such a case, in excess, the nice balance between nutrition and respiration is destroyed, the healthful action of the animal functions is impaired, the ruddy glow of health disappears from the cheek, the deep red of the furnace heated by flame overcasts the countenance, and the habits of the inebriate stand revealed. Now, if pure alcohol will do all this upon a healthy constitution—and none dare gainsay this truth—how much more fatal, and how much more speedy, must be the production of the crisis in the drinker's career, where deleterious compounds are used in its stead?—*California Culturist.*

Rotary Puddlers.

At various works in the north of England, the construction of the Danks furnace is being hurried on. A number of these furnaces will soon be at work, and will be practically tested on a large scale. At some places arrangements are being made for running the pig metal direct from the blast furnaces into the Danks puddling furnace.

Another new rotary puddling furnace has been invented by Mr. Defty, a working man in Middlesbrough, England. His plan is to feed a long revolving chamber from a cupola and run off the puddled iron constantly into ingots.

Scientific American.

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AMERICAN INVENTORS IN AUSTRIA.

Our editorial, calling the notice of American inventors and manufacturers, who may design to contribute to the Vienna Exposition of 1873, to the fact that the Austrian patent laws afford them no protection whatever, and that there is virtually no check placed upon the infringement by Austrian subjects of the patent rights of foreigners, was recently, as our readers are aware, made the subject of an expostulatory letter from General T. W. Van Buren (the United States Commissioner to the Exposition) which was lately inserted in our columns. The writer, it will be remembered, states that steps have been taken to pass a law remedying the above mentioned evils, that foreign exhibitors will be given free certificates securing priority of Austrian patent for their inventions, that the government of the country is benignly disposed toward Americans, and so on in similar tenor.

Now, notwithstanding the intimations of our correspondent to the contrary, nothing is further from our intentions and desires than to place the slightest obstacle in the path of the inventor leading to his future benefit, nor do we, on the other hand, wish to render the laborious duties of the honorable Commissioner any more arduous than they now are. We fully agree with him in the belief that the Exposition will be one of the grandest, if not the most magnificent, the world has ever beheld. The tidings of the preparations now in progress indicate that the glories of the World's Fair of England and the French Exposition of 1867 will be over shadowed. Further, we believe, without doubt, that no one, American or otherwise, can fail to be vastly benefitted by an inspection of the industrial products of the entire globe, and we freely acquiesce in the opinion that the enterprise will afford a stimulus to inventive genius in every country. Moreover, we, and so doubtless will every reader of our journal, confess to a patriotic pride in having the United States the largest and best represented nation in the Exposition. To all this we willingly agree; but we cannot perceive how "proposed laws" or the general sentiment of the Austrian government is to affect the unequivocal, undeniable fact, which at the present moment is found clearly enunciated and unrepealed in the statute books of that country, in substance if not in words, that while Austria entices the foreigner, by specious promises of possible benefit from a magnificent display, to import his inventions within her territories, she permits her subjects to pirate and convert the same to their own uses without let or hindrance. This is the plain unvarnished truth, and the reader can see its practical exemplification in the letter of one of our correspondents, now in Austria, published in another column, detailing his recent experience in the Austrian courts. The recital needs no comment as to the therein described manner of conducting legal investigation, nor as to the gross abuses it plainly sets forth; though, perhaps, we may call attention to the fact that it clearly indicates the sincerity of the sentimental protestations of the Austrian government toward American inventors.

With regard to the "proposed law": With the letter above alluded to, we were favored with a copy of this act which is stated to have passed one of the houses of the Reichsrath, and is to be submitted to the other. In substance, it is as follows: Natives and foreigners exhibiting articles, in the Exposition of 1873, which under certain Austrian laws form the subject for the grant of a privilege, trade mark or design patent, may obtain a certificate of protection therefor from the Director General of the Exposition. The application for the same is to be filed with this functionary, and must be accompanied by an exact description of the article, or proper plans if required, or in the case of a trade mark, etc., two separate copies. The certificate of protection is to be issued without charge and is to secure to the grantee, from the date of his application to Dec. 31, 1873, inclusive, "*the same rights which would be granted him by an ordinary privilege (patent) or by the ordinary registration of a trade mark, design, or model.* Applicant has the *right* to apply, previous to the expiration of the above period, for a regular patent to be allowed *as prescribed by law.*" A separate article provides that the decisions of the Director General as to the grant or refusal of certificates *cannot be complained against or appealed from.* The bill then specifies the mode of registration and number of registries to be kept, states that the certificates shall be published in the Austrian and Hungarian official journals, and declares the registers to be open to public inspection; but that the descriptions, plans, and models may be kept secret, if so requested in the application; and, finally, charges the Secretary of Commerce with the execution of the act. The preamble sets forth that the modification of existing regulations was suggested by a paper in the SCIENTIFIC AMERICAN, which was the editorial alluded to in the beginning of this article.

It is hardly necessary to point out to an intelligent reader that this so-called protective act is a deception, and is, as our correspondent says, utterly worthless. The bill does not alter the practical status of the exhibitor of a new invention. It simply obscures the main point and deceives the reader with a piece of parliamentary sophistry which amounts to nothing.

A simple contrast with the provisions contained in the patent laws of our own country will speak more strongly in reprobation of the course of the Austrian Government than any denunciations that can be uttered. The Austrian inventor in the United States enjoys all the rights of our native citizens, and his patented interests are by law jealously guarded. An Austrian inventor, should he come here to obtain a patent and find that any one has pirated his invention, or even begun its manufacture in advance of him, may still obtain a patent and put an end to the infringement. When an Austrian obtains a patent in the United States, the grant really belongs to him to dispose of, work, use, and manage, just as he thinks proper, without government interference. The Austrian Government treats the American inventor in a very different manner, as the letter of our correspondent shows.

While regretting deeply the spirit that seems to govern the action of the Austrian officials, we cannot but believe that if our representatives in that country should place the case before the government in its proper light, asking simply a reciprocity of benefits, laws would not be merely "proposed," but enacted, which would effectually do away with the present abuses. In such event, we can promise that America will forward such contributions and will evidence her vast growth in invention and industrial pursuits in a manner that will excite, not only the wonder and admiration of Austria alone, but of the whole continent of Europe.

HOW DO WE TAKE COLD?

"By sudden changes of temperature, surely," is the answer ready upon the tongue of ninety-nine out of every hundred persons who may read or hear the question that heads this article. But how do sudden changes of temperature give us cold? Too sudden contraction of the pores of the skin; sudden checking of the sensible or insensible perspiration, sudden change of circulation by which the blood is thrown, from the surface inward, upon the vitals, causing congestion, etc. All these are phenomena which may, some or all of them, be connected with too sudden or too great changes of temperature, but they fall short, even when taken all together, of accounting for that very ordinary, very amazing, and too often seriously injurious infliction, a bad cold.

Few of us but can count scores of instances in which we have been exposed to very sudden and very great changes of temperature, from warm to cold, without other inconvenience than an uncomfortable chill, while we can also count many instances in which we have taken very severe colds without being able to tell how or where we came by them. The slight and almost imperceptible, frequently unobserved, causes of cold have not, perhaps, been as closely traced as they should and may be. It seems not so much the change as the kind of change which gives rise to the unpleasant result. The leaving off of an accustomed garment, even when the lack is not uncomfortably felt, the exposure of the feet to wet or chill, a few minutes with the head uncovered in the cool outdoor air, but above all exposure to a draft of air, especially, as is generally believed, on the back of the head or neck, are all familiar examples, of which most of us have had melancholy experience. Of the last—the draft upon the back of the head or neck—the danger is proverbial. Witness the proverb, Spanish we believe it is originally: "If the cold wind reach you through a hole, go make your will and mend your soul." Or the Persian malediction: "May a cold wind blow in the back of your neck."

Indeed there seems to be, especially to peculiarly sensitive constitutions, almost a certainty of cold in such currents of air. There may be no chill, not even uncomfortable coolness, and yet the symptoms of a cold manifest themselves almost as suddenly and fully as decidedly as sneezing follows the introduction of some irritating substance, snuff, for instance, into the nostrils. By immediately heeding the warning of the first premonitory sneeze, and at once changing the position of things so as to avoid the cause, the cold may be and often is averted. But the danger is that the cause, being so slight and coupled with so little present annoyance, is apt to pass unnoticed or disregarded until too late.

We have all at some time experienced in ourselves exceptionally sensitive conditions under which it seemed impossible for us to avoid, as is said, sometimes "taking one cold on the top of another:" what a gentleman not long since in the presence of the writer called a "summer cold," in which one seems to take the more cold the warmer he is: it is a sort of sweating cold, one of the most disagreeable if not the most dangerous class of these inflictions. In this condition, the slightest draft sets one to sneezing, and it seems impossible to avoid constant accessions to the malady. But why? The sudden change of temperature theory will certainly not explain those cases where it is hardly possible to preserve a temperature sufficiently even to prevent taking cold, and those cases where cold is taken unconsciously. No hypothesis but that of a direct irritant acting upon the mucous surfaces of the lungs and air passages seems to suffice for the phenomena of a certain class of colds. That there is such an irritant in the air, in quantities varying according to the meteorological conditions, is well known, but all its properties and effects are not yet perhaps fully understood.

That ozone is such an irritant is a well understood fact; but to what extent colds, in the head, throat and lungs, are due to its agency is an open question.

M. Houzeau, describing in *Les Mondes* a process for the instantaneous oxidation of pure alcohol, in which process ozone is the principal agent, says in conclusion: "I cannot too strongly recommend the greatest caution to chemists in the use of concentrated ozone; inhaled, even in small quantities, it occasions suddenly an inflammation of the mucous membranes, which, as I have had occasion to witness, may cause spitting of blood." Such being the undoubted effect of concentrated ozone, it is certainly a plausible theory, to say the least, that currents of air containing this substance in unusual quantity, may cause such irritation to a greater or less degree, and thus be the cause of colds. In support of this theory is the fact, well known to physicians, that colds are frequently almost epidemic when there is no remarkable change in the weather, while again very great changes may be comparatively unattended by them. Said an experienced physician: "When I have one patient afflicted with a certain kind of cold in the head, I always expect more cases of the same kind." Hence the term *influenza* or influence, supposed to be in the air. Is this influence ozone?

But if colds in the head, throat and lungs, are caused by the presence of a direct irritant upon the mucous membranes, why should unwonted exposure, often in a very slight degree, give rise to colds, or why should a current of air upon the back of the head or neck be proverbially a cause for it? If breathing highly ozonized air is the cause, we should expect it to be most effective when taken directly from the front. Or may it not be possible that the phenomena of cold-taking have not yet been carefully observed, and that we are to a certain extent dealing with traditional assertions, rather than actually observed facts? There is nothing more unreliable than the observations and deductions of unprofessional people with regard to the causes of their ailments. Yet it seems to have been taken for granted that the causes of this annoying and in many cases distressing and dangerous malady, are understood by everybody, while, to the mind of the writer at least, there are, in the list of ills that flesh is heir to, few that have more mystery about them than this, perhaps the most frequent of all.

INTEROCEANIC CANAL.

Mr. James C. Madeley, in a letter to the *Engineer*, takes the ground that a canal across the isthmus, between the Atlantic and Pacific oceans, is perfectly practicable, and that the available route lies across the isthmus of Panama where the railway crosses; and gives as a reason why this route was not examined by the present exploring expedition that "the Government knew all about it." This latter point may be well taken. It is not unfrequently the case that the actually feasible is overlooked in searching for something better.

The cost of such a work, even at the exorbitant prices of the construction of the Panama railway, is estimated at $100,000,000 for a canal about the same size as the Suez. It would necessitate cutting some miles in length, with a summit depth of about 180 feet, rapidly decreasing from the summit each way, which cutting, with the locks, would constitute the principal cost. The length would be about that of the Panama railway, that is, about 47½ miles.

The writer compares the several proposed routes, and shows the advantages to be all with the one under discussion, aside from the facilities afforded by having a railway along the route during the construction; the views expressed are worthy of consideration. That the canal is to be made, sooner or later, is only a question of time. Considered with reference to the benefit to be derived from such an enterprise, the cost, even at twice $100,000,000, is a mere *bagatelle*.

EFFORTS IN GERMANY TO PREVENT EMIGRATION.

As currents of air and water act in accordance with certain unchanging laws, so tides of emigration and immigration are governed by stimuli presented by the natural and artificial advantages of different localities. To the mechanic, the artisan, the laborer, our country presents inducements, compared with most of the countries of the Old World, which may be said to almost compel the influx of these classes. It is in vain, therefore, that the German Government issues threatening circulars against emigrants, and declares that they will be treated as outlaws over whom has been instituted a special surveillance and supervision. There is room for them in our factories, our workshops, our industrial enterprizes, and on our limitless Western plains, and while there is room for them they will come.

A REDUCTION in the price of steel is promised for December next.

DEVELOPE YOUR INVENTIONS.

Many persons gifted with inventive talent are prone to neglect it from the supposition that the field is already crowded, and that but little inducement is offered to compensate for the outlay of time and money necessary to secure an invention. That this is fallacious, every observing person can testify. So far as useful inventions are concerned, the demand is unlimited, but we fancy one reason for the disappointment of some is found in the fact that they look more to the *éclat* or publicity attaching to a novel and sensational invention than to the solid advantages accruing from a useful and practical one. Thus many scheme upon flying machines, or mechanism to develope great power from a limited supply, apparatus to extract the milk of cocoa nuts, or similar contrivances of doubtful utility when perfected, and find, after all their labor and expenditure, that there is little or no market for the wares they can produce, or that, having invented the machine, their task is but half accomplished till they invent a demand for it also.

Whatever may be said to the contrary, our experience teaches us that the inventive faculty is a rare one, a gift that individuals have no moral right to neglect, and a means, if properly directed, of raising its possessor to affluence. Aladdin's lamp was an incumbrance compared to it; for where the said Aladdin was compelled to furbish up a presumably ill smelling, brazen utensil, and await the appearance of the quite intolerable personage who was its slave, the inventor has only to set his wits to work, or follow out the hints his talent constantly gives him, to laugh Alladin and his possession to scorn. Our readers must receive this in good faith as it is written, for we can recall scores of men who have raised themselves from extreme poverty, and in many cases from actual want, by simply cultivating their powers of observation, and applying them to remedying defects existing in the arts and sciences. These men were by no means "great discoverers" in the ordinary sense of the term, but did the duty nearest them by correcting palpable defects coming under their notice; and, having once conceived an idea, by following it to the end. It is not necessary to strengthen this position by practical examples; any one who takes the trouble to reflect can see that it is correct in all points.

We say then, in conclusion, that, if you have a really good and useful invention, a machine, process or what not, for lightening labor, reducing expenses, or increasing the production of staple articles, you have a valuable property that cannot fail, with ordinary business management and sagacity, of a satisfactory return. Bring it forward and secure it, for while you are neglecting it, some other person of more energy is scheming to anticipate you.

DISINFECTANTS.

Disinfectants may be divided into three classes: 1. Those that arrest fermentation (antizymotics); 2. Those that effect chemical decomposition; 3. Deodorizers. Those of the first class include the coal tar products, heavy oil of coal tar or dead oil. Carbolic acid and its preparations are included in these. Dead oil has been used extensively; but in its commercial form, it is very apt to be without the peculiar virtue it possesses in the crude state. This is owing to the absence of carbolic acid, which is usually extracted before it is put in the market. Carbolic acid, obtained by treating this crude oil with hydrate of soda and lime, is expressed by the symbol $C_{12}H_5O,HO$. The impure form is that best adapted for the purpose of disinfection, both by its low cost and its easy solubility. Its disinfecting power is most markedly shown in contact with putrifying nitrogenous matter. Carbolic acid when mixed with chalk is sold under the name of carbolic powder. This is a very poor disinfectant, not only because 70 per cent of it is an inert substance, possessing no disinfecting properties whatever, but because, after a few hours, the carbolic acid passes off into the air. Carbolate of lime is a valuable preparation, however, for it contains two disinfectants of different orders. This substance is not, strictly speaking, a chemical salt, but is hardly more than a perfect impregnation of the lime. A very good preparation, and one that will meet all requirements, is the following: Crude carbolic acid, 1 ounce, sulphate of zinc, 8 ounces, water, 3 gallons. Carbolic acid effects its disinfection by a coagulation of the albuminous matters.

Under the head of disinfectants of this order, we find sulphate of zinc, protosulphate of iron, and sesquichloride of iron. All of these enter, to a greater or less extent, into different preparations offered for sale. The Girondin fluid, so much used of late, is a combination of the dead oil of coal tar, sesquichloride of iron, and other substances. For the disinfection of low damp places, cellars, and sinks, the sesquichloride of iron is invaluable. Condy's fluid, which can be made on a small scale by mixing together two ounces of red lead, two ounces of common salt, and four ounces of oil of vitriol, is a powerful antiseptic agent.

The second class, namely, disinfectants effecting chemical decomposition, may be enumerated as lime, chlorine, sulphurous acid, sulphate of copper, chloride of zinc, and soda or Labarraque's solution, permanganate of potash, bromine, etc. etc. These substances work by oxidation of the offensive substance, or by destruction of the germ. This is seen most markedly when the permanganate of potash is used, when the black oxide of manganese is thrown down as a fine powder. Chloride of lime is one of the best disinfectants, either alone or with other substances. When it is used in damp places, it should be mixed with carbonate of soda or some other substance to counteract its hygroscopic properties. Sesquichloride of iron is especially indicated for privy vaults where there is evolution of sulphuretted hydrogen gas. The sulphur is precipitated, while the hydrogen is set free. The iron acts most energetically as a check to fermentation. Most of these disinfecting substances owe their efficacy to the chlorine contained, and probably those emitting the largest quantities are the best.

Sulphurous acid, formed by the combustion of sulphur, stands unrivalled as the most perfect disinfectant of rooms and buildings impregnated with the germ of the eruptive fevers. In small pox, scarlatina, and measles, particularly, the room occupied by the patient should be well fumigated by this substance. For the prevention of the spread of cholera and the inflammatory diseases of the alimentary canal, carbolic acid and chlorine are the best. Bromo-chloralum ($Al_2Cl_3,2BrO$) possesses remarkable powers of absorption of sulphuretted and phosphoretted hydrogen gases; it is, therefore, indicated for the disinfection of privy vaults and sinks, where these gases are found. It is a new preparation of a straw yellow color and fluid consistency. The sesquichloride of aluminum, from which it is made, is a crystalline salt, rapidly deliquescing. It is manufactured by several English and American chemists, but owing to its comparatively high price, it will not come into general use as long as we have cheaper disinfectants with greater virtues. One advantage is its slight odor.

Absorbent deodorizers are the third class, and consist of substances that merely absorb the effluvia from putrid and decaying matters. Such are charcoal, both animal and vegetable, and dry earth. A cheap variety of bone charcoal has lately been used which is mixed with peat. All of these substances must be finely pulverized and dried. Dry earth has proved its extraordinary virtues in the patent earth closet, and in the hospitals of Philadelphia. At the latter place, it was found not only to absorb the septic matter from wounds, but to destroy all traces of odor in the wards.

There are many household agents that are constantly used. Among them are burnt vinegar, burnt sugar, pastilles and the like, but the bad smells are only disguised for the time.

Disinfectants may be used either in form of solution, or in the dry state. Either of the substances alluded to above should be placed in saucers, in the upper part of the room as near the ceiling as possible; and in vaults, privies, and other places of the kind, they should be liberally sprinkled on the surface of the offensive substance. Chlorine gas may be generated in a simple manner by exposing four ounces of the black oxide of manganese, moistened by eight ounces of oil of vitriol, and four ounces of water in a shallow earthen pan; this mixture will continue to liberate chlorine for several days. Cloths dipped in the carbolic acid solution and hung about the place to be disinfected will completely remove all bad odors.

MOLDING SAND FOR IRON FOUNDERIES.

Molding sands, according to Robert Mallet, may be divided into two classes: the first consists of those in which the grains are simply fine fragments of hard minerals (quartz or felspar) and which are reduced, washed and rounded off by Nature. To the second class belong those in which each grain represents a small natural crystal. Although round grained sand may be a good molding material, the best kind is undoubtedly the one in which a large portion of the quartz is present in the form of crystals. The best English sand occurs in the oldest formations, the carboniferous group and the trias; and although good kinds of sand are found in the more recent formations, the English molder prefers generally the "red sand" from the new red sandstone to meagre or fat sand of alluvial origin.

These are the principal considerations; but it is, moreover, according to Mallet, important to know whether the sand possesses the necessary durability, that is, whether it can repeatedly furnish good molds. It is true that any sand may serve the purpose once; but for the second time, the molder often is obliged to use it for refuse casts. Such sand is termed "burned," and it must be replaced by a fresh supply. When freed from clay and carbon and then compared with fresh sand under the microscope, we find that the grains of the former are cracked and divided into fine fragments. Originally, such sand generally consists of fragments of crystals with fissures, often filled with iron ocher or oxide of iron; in other instances, it is of a different molecular condition, so that it will decrepitate as soon as it is sufficiently heated. The change constitutes what is called the burning.

In selecting molding sand, therefore, it must be seen that the grains are solid and not broken particles, and that they are not likely to crumble. These conditions are generally fulfilled by the new red sandstone (which, by the way, occurs in the valley of the Connecticut river), provided that it has not too long been exposed to the influence of air and water.

In castings of great depth, where the liquid metal presses with great force upon the sides, it is often difficult to prevent, upon the surface of the casting, fusion of the rims and the formation of furrows on the sides of the forms. The mixture of iron and fused silicates produced resists the best cast steel chisels, and the blackening is sometimes torn off in large pieces. In making moldings for Bessemer steel, which have to resist a higher degree of heat, it is best to prepare a sand or loam from fine clay and quartz. In the steel works at Bochum, Prussia, they cast tyres and wheels for rolling mills of steel, and the manner of making the molds is still considered a secret. Mallet supposes that the sand used consists of a mixture of fine grained crystalline quartz sand and of still finer crushed "artificial sand," which is produced by crushing steel melting pots. It is likely that both materials are bound together with a moderate admixture of wet clay, prepared from the white fireproof clay of the carboniferous group. As regards the coal dust, it may be anthracite or the levigated coal of gas retorts. The blackening seems also to consist of pure fireproof clay and meager coal.

Excellent natural molding materials are the titanic iron sands of the western Italian coast (between the Tiber and Naples) and of New Zealand, which are likely to find great use for casting. This is the case with the volcanic tufas, consisting of light refractory dust, which occurs of all colors, but is generally whitish yellow or gray. This tufa sand is found in all countries and is exceedingly well adapted for casting works of art. For massive castings and bronze, such materials are most valuable. Respecting the parting (isolating) sand, it should be clear, of fine grain, dry and of bright color, so that, in opening the molding boxes, the surfaces of the castings may be readily distinguished from the surfaces of the box.

For blackening, they use in England mostly coal dust and soot. Sometimes the sand is mixed with foreign substances, such as molasses and water, beer, yeast, oil, the washings of the starch factories, etc. The addition of coal dust, which is used to the amount of one fifteenth to one twentieth for green sand, and of one twentieth to one tenth for artificial sand, is common. Experience, of course, can be the only guide in selecting the proper proportions.

Among the means for regenerating the sand, the following are in use: Plowing and heaping up in long rows with furrows of from one to three inches; in this state, it is allowed to lay for some time, whereupon it is mixed with fresh coal.

Let us add a few remarks on the process of blackening. The mold is dusted when green sand is used, and brushed over with black wash when dry sand or loam is employed. With regard to the question in what manner these materials act, it has been shown by Schafhäutl, that coal, if brought to a white heat, may form graphite. Graphite is formed in blackened molds, provided that the heat was not sufficient to burn it up; this may be seen in a microscopic examination of the castings. This graphite may act in a twofold manner; first, the crystals lay themselves flat against the sides of the mold and thus prevent the iron from penetrating into the same, or oxide of carbon is formed, which prevents the iron from oxidation. Whether or not cementation (reaction between the blackened mold and the slowly cooling metal) takes place is difficult to decide, but it is certain that a casting produced without blackening shows a different appearance from that of a well executed casting, which has a uniform, bluish gray surface with close grain.

We suggest to founders that—considering the great lack of trustworthy information respecting molding sands still existing among the craft—they would do well to communicate their experience to the technical periodicals of the country.

ANIMAL HEAT AND DISEASE.

All animals have a temperature above that of the gaseous or liquid medium in which they live. The temperature of warm blooded animals remains nearly the same in all climates; in man and other mammals, it is, on an average, 37° C.; in birds about 41°. On the other hand, cold blooded animals have a temperature varying with that of their medium, and always slightly in excess of it. Animals of warm blood show slight normal variations of temperature with, for example, the seasons, the hour of day, sleep, food, digestion, age, etc., but we propose at present to consider the abnormal variations which arise when the equilibrium of the system is disturbed.

So delicate, as we all know, is the mutual dependence of the various parts of the body that, when the least injury is inflicted on one, there ensues disarrangement of the whole. The nervous system, charged with maintaining the harmonious intercommunication of the frame, transmits on all hands the abnormal impression. It is not the generator of animal heat, but it is the regulator of it; it directs and superintends, so to say, the production and distribution of heat according to the varying bodily requirements. Any injury done to the nerves tells on the animal heat. By cutting the sympathetic nerve of a rabbit at the neck part, M. Claude Bernard produced an elevation of temperature of several degrees. In this and like cases in which the nervous action is suspended, the blood flows in greater abundance, carrying with it more thermal energy. Where the opposite takes place, the blood vessels contract, and the temperature falls.

Insufficient food and abstinence affect animal heat, but not immediately. The system continues at its normal temperature till it has exhausted its reserve of combustible material. Then it gradually becomes cold. If an animal which has been deprived of food several days be put into a medium moderately heated, its functions will somewhat revive; but the change is of very short duration.

The hand of a person who suffers from some inflammation of the chest, or from infectious fever, is burning hot; that of one who has dropsy, or emphysema (in which the body is distended through accumulation of air), is cold as marble. The morbid influence is almost never compatible with the normal temperature of the body. In the times of Hippocrates, before there was any examination of the pulse, elevation of temperature was looked on as the essential element in fever. Galen defines fever "an extraordinary heat (*calor praeternaturalis*). Nor has this idea been overthrown by modern research. The pulse may rise to extreme limits without febrile action—as in hysteria. Whenever the heat of the body exceeds 38°, it may be affirmed there is fever. When it falls below 36°, we have what is called *algor*. Thus the proper limits of normal heat are about two degrees. On either side of these limits, the state becomes one of disease.

Acute inflammations, such as those in pleurisy, bronchitis, erysipelas, etc., are characterized by a period of 36 hours, or about two days, in which the temperature gradually rises to 41°. On the third day it begins to fall, and does so (with

slight variations) during three to seven days, when the disease has run its course. Where the temperature gradually increases after the third day, a fatal issue may be looked for. Persistent heat is here the precursor of death. In such diseases as variola and scarlatina, the heat increases until cutaneous eruption; there it remains at its maximum (about 42½° in scarlatina) till the eruption is completed—when it begins to descend irregularly to the normal state.

Animal temperature also rises in such cases as wounds, tetanus, aneurism, etc.; in strangulations, certain kinds of poisoning, burns, and other cases, it falls.

Such increase and diminution in animal heat can only be attributed to a corresponding change in energy of the combustion which goes on in respiration. In what precise way morbid influences accelerate or retard the calorific process does not clearly appear. Some medical men suppose a fermentation in the blood, producing such small organisms as bacteria and vibria. Others think that when local inflammation takes place, the inflamed organ communicates heat to the whole body, like a stove in a closed space. Others explain it by nervous action.

Swammerdam, in the seventeenth century, seems to have been the first who employed the thermometer in treatment of disease. De Häen and Hunter, in the last century, also made use of it; but it is only recently that clinical thermometry has assumed a large importance. The spirit of research has not been content with noting the fact of a change of temperature in disease; but the variations have been followed, day by day, hour by hour, and carefully recorded. Curves are drawn representing these variations; and each disease has its characteristic curve, which is modified in a determinate manner when the disease is subjected to this or that curative agent. By comparing such curves with the symptoms observed, the stage of progress can be ascertained and treatment suited to it. For diagnosis, it proves often most valuable. Thus, in cerebral hemorrhage, the temperature falls suddenly to 36° and even 35°; while, in an apoplectic attack, it remains at about 38°. These two maladies, quite distinct in reference to treatment, are yet liable to be confounded by the observer. The thermometer obviates such confusion. So with other cases.

In the foregoing facts, we have a sample of the benefit practical medicine may derive from physical science, and the precision it may attain by the application of instruments capable of measuring morbid symptoms. In banishing the often imperfect and erroneous judgment of the senses, and substituting, as far as possible, the distinct indications of an exact instrument, a large proportion of the obstacles to methodical treatment of disease are removed. Such instruments, besides, often reveal peculiarities which would escape direct observation. Clinical thermometry is to be reckoned an undoubted advance in the science of medicine.

EDMUND HENRY KNIGHT.

It is with deep regret that we record the death, at the early age of 40 years, of Mr. Edmund Henry Knight, of the editorial staff of the SCIENTIFIC AMERICAN. He was formerly a leading and well known member of the City of London Literary and Scientific Institution. He came to this country in 1852, and soon became a contributor to several of the magazines and periodicals. But the branch of literature in which he peculiarly excelled was in the writing of descriptions and analyses of machinery and mechanical devices. His perception of the construction and arrangement of the parts and merits of a machine was almost intuitive, and the whole apparatus seemed to be formed in his mind at once, whether assisted by a drawing or a mere verbal description.

The pleasant amiability of his manner secured for him many friends, by whom his memory will be warmly cherished.

THE FAIR OF THE AMERICAN INSTITUTE.

Since our visit of last week, a new boiler, the Whittingham, has been placed in position, making four in all now supplying steam to the various machines. This boiler is of novel pattern. Its tubes, which are inclined and extend lengthwise, are made double, the heat passing around the exterior of the outer tube and then back through the inner one, while the water is contained in the space between the two. Tests will be applied to this generator, we understand, during the progress of the exhibition, from the results of which we shall be able to judge of its merits. Resuming the article in our previous issue, we continue the description of the

STEAM ENGINES.

A handsomely built Massey rotary engine of 150 horse power is one of the most attractive machines on exhibition. Attached to it is a new and improved arrangement which enables the engineer to increase or diminish the point of cut-off at will while the engine is in motion. Kipp's revolving cylinder engine is remarkable for its compactness. The one exhibited is of six horse power, though occupying but 22 inches square of floor space, and being but 30 inches in hight. The cylinder contains two double pistons at right angles to each other, their connecting rods being in the same vertical plane, both operating the same crank. Steam is admitted at the side. The exhaust communicates with a feed water heater underneath the machine, thus utilizing the warmth of the steam. Babcock & Wilcox exhibit a vertical steam engine of ten horse power, designed for steam yachts, which seems excellently adapted to the purpose.

HOISTING ENGINES.

One of the best finished pieces of machinery in the Fair is a geared hoisting apparatus, from Cook, Rymes & Co., of Charlestown, Mass. The engine is of the ordinary horizontal type. There is a small rotary hoister, from Lighthall, Beekman & Co., displayed, which seems to give very fair results, doing good work with a steam pressure of 60 pounds. Its movements are entirely controlled by steam pressure. Wm. D. Andrews & Brother, in addition to their well known friction hoisting engine, exhibit a new differential gear hoister for elevators. In the interior of a drum attached to a shaft are two sets of gear, for hoisting and lowering respectively. One third of the gearing is always engaged, so that it will always hold in event of a belt breaking. On the shaft are two pulley wheels which are made to revolve in opposite directions by similarly arranged belts. Either wheel can be thrown into operation to hoist or lower, as required, by means of a Volney Mason double friction clutch moved by a hand lever. This invention seems to be one of the safest yet devised for the above mentioned purpose.

PUMPS.

Under this heading, we have little of novelty to describe. Andrews & Brother and Heald & Cisco exhibit two huge centrifugal pumps which, from the cataracts of water they discharge, form subjects of great interest and call forth innumerable expressions of wonder from uninitiated visitors. There are two vacuum pumps. Prall's consists of two cast iron empty cylinders, on the outside of which the valves are situated. They operate by allowing the enclosed steam to condense, thus forming a vacuum into which the water rushes. The stream is then expelled by direct pressure of steam. Hall's pulsometer or magic pump is a similar invention, but more compact, as it is cast in a single piece.

White & Moritz exhibit a horizontal pump, with guides and an outside thread on the stuffing box gland. These manufacturers show the working of their pump valves through a plate of clear glass inserted for the purpose. The idea is a good one and should be followed. Hardick's Niagara pumps are, as usual, in a prominent place. Four are on exhibition, and all noticeable for remarkably good workmanship. Condé & Co., of Philadelphia, display a very simple horizontal pump. The steam valves are uncovered by the piston at each end of its stroke, thus doing away with tappets and other gear. E. T. Jenkins has a new pneumatic pump, which forces air into barrels and thus causes their contents to be driven out. Several other steam pumps are exhibited, which call for no special comment.

GAGES, GOVERNORS, BOILER ATTACHMENTS, ETC.

The Recording Steam Gage Company has four of its instruments, and Charles G. Willey shows a 24 inch steam gage, in operation. Three governors are exhibited, two already well known, the Shive and the Condé, and one of novel invention, the Duff. The latter consists essentially in the arrangement of a centrifugal or rotary pump, receiving motion from a steam engine and working in a barrel or cylinder containing a piston which connects with the throttle valve in such a manner that, when the speed of the engine increases beyond the desired point, the pressure of the fluid, brought to bear on the governor piston by action of the rotary pump, closes the throttle valve. The Berryman Manufacturing Company are represented by their feed water regulators on all the boilers. The Albany steam trap, recently described in our columns, is also in operation. In belting, the only novelty is the double triangular belt described in our preceding article.

There are surprisingly few novel inventions, under the heading of this paragraph, on exhibition. Whether it is because the Fair is still incomplete (although the space seems well occupied), we are unable to state; but in the machinery department generally the number of machines not only appears to be smaller, but the variety is less and the articles displayed are of inferior interest to those contributed to the exhibitions both of last year and the year before.

Statistics of Cotton Manufacture.

The Census Office at Washington furnishes the following statistical information relative to the cotton industries of the United States. The number of distinct establishments is 956. Of these, Massachusetts has more than any other State, 191, while Virginia has but 11.

Number of steam engines, 448; aggregate horse power, 47,117. Number of water wheels, 1,250; aggregate horse power, 102,409. Number of looms used, 157,310; frame spindles, 3,694,477; mule spindles, 3,437,938. Hands employed, 47,790 males above sixteen years; 69,637 females above fifteen; 22,942 children and youths. The aggregate amount of wages paid during the year was $39,044,132. Materials used, 6,222,189 pounds of cotton yarn, 136,100 pounds of cotton warp, 5,234,260 pounds of cotton waste.

Value of mill supplies, $10,910,672; total value of all materials, $111,737,686. Articles produced—478,204,181 yards sheetings, shirtings, and twilled goods; 34,533,462 yards lawns and fine muslins; 489,250,053 yards print cloths; 30,301,087 pounds yarn; 11,560,241 dozen spools thread; 73,018,045 yards cotton warps; 11,118,127 pounds batts, wicking, and wadding; 493,892 tablecloths, quilts, and counterpanes; 2,767,060 seamless bags; 5,057,454 pounds cordage, lines, and twines; 906,066 pounds thread; 8,390,050 yards cotton flannel; 39,275,246 yards ginghams and checks; 7,921,449 pounds waste; 484,400 pounds tapet wadding; 405,585 pounds seamless bags; 13,940,895 yards cassimeres, cottonades, and jeans; 10,811,028 pounds miscellaneous products. Aggregate weight of goods produced, 349,314,592 pounds; aggregate value of product, $177,489,739.

STEAM SCREAMING PROHIBITED.—By an act of Parliament the use of steam whistles, for summoning and dismissing workmen or persons employed in any manufactory or other place, is prohibited in England under a penalty of $25.

Reaping Machine Trials.

A competitive trial was lately made at Brampton, England. An influential committee was appointed, the judges selected being Mr. M'Kinnell, of Dumfries, Mr. Dods, of Hexham, Northumberland, and Mr. Little, of Fauld, Longtown; and no fewer than forty-three machines by the principal manufacturers in England, Scotland, and America were entered for competition. The machines were divided into three classes, but the great interest centered in the self delivery reapers, which, from their independence of manual labor (requiring only the driver), are far superseding the manual delivery machines. The trials commenced in a sixty acre field of oats, the land being rather hilly, and the crop much laid. The judges selected five of the machines for further trial. On the following day, these selected machines underwent a more extended trial. Towards the conclusion it was evident that the first prize lay between the "International" reaper of Messrs. Howard, of Bedford, and the American machine invented by Messrs. Kirby, of Auburn, New York State. The final test, however, was cutting a tangled and twisted crop, which the Howard "International" machine accomplished without difficulty, the American Kirby choking. The first prize was, therefore, unanimously awarded to Messrs. J. and F. Howard, Bedford, and the second to the Kirby machine. Messrs. Brigham, of Berwick-on-Tweed, was highly commended, and Mr. Bickerton, also of Berwick-on-Tweed, was commended. The trials were attended by all the leading agriculturists of the district, and the interest manifested in the proceedings was sustained to the end. The arrangements were good, and were all carried out in an able manner under the superintendence of the honorary secretary, Mr. Coulthard.—*Engineer.*

THE Postmaster General has contracted with the White Star line of steamers for the transport of the United States mails, between New York and Queenstown, Ireland, for one year, ending December, 1873, the compensation being the amount received for sea postages. A steamer leaves this port every Saturday. It appeared, on careful examination, that the steamers of this line average about twelve hours less time than the ships which have heretofore carried the mails.

In a boiler of fair construction, a pound of coal will convert 9 lbs., of water into steam. Each pound of this steam will represent an amount of energy or capacity for performing work equivalent to 746,666 foot pounds, or, for the whole 9 lbs., 6,720,000 foot pounds. In other words, one pound of coal has done as much work in evaporating 9 lbs. of water into 9 lbs. of steam as would lift 2,232 tuns 10 feet high.

DURING the month of August there were sixty-three railway accidents reported in this country, one person being killed and ten injured. From January to August inclusive of the present year, there were 235 railway accidents, 156 persons were killed, and 489 others were injured.

ON THE USES OF GAS.—Mr. Henry Wurz, editor of the *Gas Light Journal* of this city, announces that he has in preparation a new work upon the utilization of gas for lighting, warming, cooking, kindling, motor, and other purposes, adapted for popular instruction on these subjects.

A Tyndallic Ode.

[*Tune:* "THE BROOK."]

I come from fields of fractured ice,
  Whose wounds are cured by squeezing,
They melt and cool, but in a trice
  Grow warm again by freezing;
Here in the frosty air the sprays
  With fern-like hoar frost bristle,
Their liquid stars, their watery rays
  Shoot through the solid crystal.

I come from empyrean fires,
  From microscropic spaces,
Where molecules with fierce desires
  Shiver in hot embraces;
The atoms clash, the spectra flash,
  Projected on the screen,
The double D, Magnesium b,
  And Thallium's living green.

This crystal tube the electric ray
  Shews optically clean,
Nor dust or cloud appear—but stay;
  All has not yet been seen;
What gleams are these of heavenly blue,
  What wondrous forms appearing?
What fish of cloud can this be, through
  The vacuous spaces steering?

I light this sympathetic flame
  My slightest wish to answer,
I sing, it sweetly sings the same,
  It dances with the dancer;
I whistle, shout, and clap my hands,
  I hammer on the platform,
The flame bows down to my commands
  In this form and in that form.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

Notes & Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.

1.—WELDING CAST IRON TO STEEL.—On page 144 of the current volume of the SCIENTIFIC AMERICAN, there is a description of the manufacture of axes by welding cast iron, as it comes from the flask, to steel. There are a great many of your readers who would like to know how it is done.—J. P.

2.—CRACKS IN GLASS.—Having recently found a crack in a bottle which I was cutting in two, I was surprised to see that, when I tapped the bottle gently with a pestle, the crack elongated and immediately shortened again, so that the closest inspection did not discover any trace of the extension of the fracture. Can any one explain this?—A. C. R.

3.—CEMENTING WOOD TO GLASS.—What is the best cement for this purpose? There is a moderate strain on the wood.—W. R. JR.

4.—GALVANIZED IRON BOILERS.—You have cautioned the public against using these; what is the best kind to replace them? How can I remove the zinc coating? The water comes 200 feet in a lead pipe, and I consider that arrangement sufficiently poisonous for the present.—P. M.

5.—ELECTRIC LIGHT.—How can I make an electric light and the battery therefor, and how strong a battery do I need?—F. D.

6.—DECOMPOSITION OF COAL.—Is anthracite coal injured by exposure to the weather? If so, what changes take place in it? I find that a sample immersed in water for 48 hours does not increase in weight.—C. M.

7.—OZONIZING OIL.—What is the cheapest and simplest manner of introducing ozone or ozonized air into oil?—B. S.

8.—PLANTS GROWING IN WATER.—What species of plants will grow best in a vessel supplied with water only? What seeds, besides acorns, will grow when suspended near the surface of water?—J. W. K.

9.—STAINS ON PRINTS.—I would like to ascertain how water stains can be taken out of prints without injury to the picture? Also how to remove stains caused by mildew?—K.

10.—BISULPHIDE OF CARBON.—I would like to obtain bisulphide of carbon perfectly pure, while in a gaseous state. Is there any agent to pass it through that will rid it of the sulphuric acid, sulphuretted hydrogen, or particles of sulphur?—H. B. B.

11.—SLIP OF DRIVING WHEELS.—Are not the driving wheels of a locomotive more liable to slip on the track, and do they not have less power to keep up the rotary motion when on the stroke that brings the connecting rod between the track and axle than when on the opposite over stroke?—C. T.

12.—BLENDING SOAP AND CHALK.—How can I mix castile soap (which is fresh and still soft) and precipitated chalk, ⅜ of the former and ⅝ of the latter, on a small scale? I have used a mortar and pestle, but in mixing 200 or 300 pounds this will not answer the purpose.—W. K.

13.—SPECIFIC GRAVITY.—D. B., of N.Y., on page 170, in answer to J. P., query 15, page 153, states that a body will weigh more at the poles than at the equator, owing to the flatness of the earth at the poles. Query: Does not the centrifugal motion of the earth at the equator partially counterbalance the force of gravitation? If so, is not that another reason why a body will weigh more at the poles than at the equator? And if not why is the earth at the equator raised, and at the poles depressed?—H.P.C

Answers to Correspondents.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

ALL reference to back numbers must be by volume and page.

CARBON FOR BATTERY.—J. G. C. asks: What is the carbon used in Bunsen's and other batteries? Will charcoal answer the purpose? Answer: Charcoal will do, but the best carbon plates are made by taking coke from gas works, pulverizing it, making a paste with a little flour and sufficient molasses, molding it into shape, and drying it in an oven.

CEMENTING WOOD TO IRON.—W. T. V. asks for a means of firmly securing wood fitted tightly into a cast iron socket. Answer: Paint the inside of the socket with oil paint (white lead will do), then glue the wood in with strong glue.

R. B. suggests the employment of Mr. Lamm's fireless engine for the propulsion of omnibuses or cars on ordinary roads. Omnibuses drawn by road steamers are used in Scotland with much success.

P. S. B., having had a dispute about self acting machinery, says: Please say if there has ever been a clock made that went of its own movement, making its power by which it moves, or, in other words, a self winder. Some parties assert that a clock of this kind was manufactured by a watchmaker in Schwerin, Mecklenburg-Schwerin, Germany. Answer: We have seen a clock that was wound by the rise and fall of oil contained in a tube, in which was a piston. The expansion and contraction of the liquid, caused by the ordinary changes in the atmospheric temperature, was made to operate the piston, one end of which was provided with toothed racks, and so arranged that the motion of the piston acted on the barrel of the spring to wind it up. This clock was exhibited as a "perpetual motion." As to the particular clock you speak of, we have no information.

RUSTY LIGHTNING RODS.—A communication in your paper a few weeks since, on the lightning striking the rod on the Washington monument at Baltimore, has induced me to ask whether a rusty rod is of any use in protecting buildings? A few years ago a company came around putting up a cable rod. I had an old rusty rod up at my house. They said a rusty rod did no good, and said they formed a battery in the ground by putting a piece of copper and zinc around the rod, which prevented it from rusting, and would take off any rust there might be on it, which statement was a humbug. In less than one year it was as rusty as it could be, and as the one they took down. Now there are other parties around, saying a rusty rod is of no use, and wanting to take down this rod and put up theirs, a galvanized rod.—H. C. Answer: There would be no advantage in the change. A rusty rod will conduct the electricity as well as if it were galvanized.

POSITION OF ECCENTRIC ON CRANK SHAFT.—To M., query 11, page 122.—In a well constructed slide valve engine, the extreme throw of the eccentric is about three eighths of a revolution in advance of the crank (when a rock shaft is not used), and not at right angles, as argued by the foreman spoken of. And you are right in regard to placing it in position so that the valve will open at the right point. The foreman should assist a machinist in setting up some slide valve engines.—G. B. S.

CLOSING THE PORES OF WOOD.—O. S. C. asks for directions for closing the pores of wood so as to make it air and watertight. Answer: Painting or varnishing will effect it; if you use varnish, choose one that will resist air, water, or whatever else your wood may be subjected to.

L. K., of Mass., sends a mineral specimen and desires to know what it is, and if it is worth anything, and what it is used for. It was, he says, dug out of the earth in one of the hills in his town. He found also another article on the same hill which is very fine earth and seems to be full of bright gold colored dust, so that when rubbed in the hand it presents a bronze appearance. Answer: The specimen you send is kaolin earth, resulting from the decomposition of granite. It consists mainly of silica and alumina, and is used, when pure, in the manufacture of porcelain ware. The other substance referred to is probably micaceous or talcose earth; we cannot decide without a sample.

L. S., of Pa., writes: Enclosed I send you a sample of incrustation from my steam boiler. Whatever it is, it eats through the iron very rapidly, and blowing the boiler off once a day does not seem to relieve it at all. I use water from a natural spring. I think it is mostly salt in the water, with perhaps some lime which gets into the water courses from the surface, as there is a great deal of salt water pumped out of the oil wells and allowed to run out upon the ground. I should like you to tell me what this sample is composed of, and what I can use to counteract the effect of it on my boiler. I read a short time ago that the Oneida Community had overcome a somewhat similar trouble by the use of tannate of soda. Could you tell me the proportion to use and whether it would be beneficial in my case? Answer: The corroding substance is, as you suspect, chloride of sodium (common salt), with lime, iron, and other impurities. In our opinion, it will be far cheaper to secure rain water for your boiler than to attempt to neutralize this with any chemical substance.

DIAMONDS.—To C. W. P., query 1, page 138.—The best test is experience; but if it be not a diamond, it can be scratched with a file. A diamond also is cold to the touch, and all imitations are w rm. As regards the value there is no rule, as stones vary in color and shape. The old English rule, previous to 1843, was to square the weight of the stone and then multiply by 40, but now it would be more nearly right to square the weight and multiply by 120. This rule only applies to white and perfect stones.—J. H. G., of N. Y.

FETID WATER.—To E. H. H.—The cistern is made of white pine. The water is from the roofs covered with pine shingles. The water does not come in contact with paint of any kind. The pump pipes are of iron, conductor pipes, of tin. The pump is used constantly.—F. D. H., of N. Y.

POSITION OF ECCENTRIC ON CRANK SHAFT.—To M., query 11, page 122.—You are right and your foreman is wrong. The position of the eccentric varies with the lap and lead of the valve; a valve cutting off at ⅞ stroke does not have as much lead as one does cutting off at ⅝ stroke. The more lap you have, the more lead you have, because if the valve is longer (or has more lap), the eccentric has to be farther ahead to open the port. Engines running very fast require more lead than slow ones.—C. W. W. of Ind.

TO DETECT SULPHURIC ACID IN VINEGAR.—Mince the pickles with a glass or ivory knife, and then pour over them a little weak ammonia. If a blue color be produced, it is certain they contain sulphuric acid. The above is as simple and certain as any test I have ever tried.—D. N. B., of Pa.

VALUE OF PURE GOLD.—To S. A. G., query 7, page 138.—The value of gold, 24 carats fine, is $1·04 to $1·06 per dwt.—J. H. G., of N. Y.

EXTERMINATING ANTS.—I send the *modus operandi* of Texas: Take four ounces of cyanide of potassium and one pint of water, and after it is dissolved, pour one tablespoonful or more down their nests or where they frequent. The effect is so powerful that the smell will kill them, but it must be used with care, as it is poison to man and beast.—M. M., of Texas. We advise no person to use the remedy. Better endure the ants than the risks of poison by having cyanide of potassium about your house.—EDS.

GUNPOWDER IN CARTRIDGES.—To C. W. L., query 17, page 153.—Gunpowder in paper cartridges, if kept dry, does not deteriorate. A great difficulty, however, arises from the utter spoiling of the fulminate or priming, even in metal cartridges, so rendering them quite useless. Such cartridges, kept in a ship or other magazine, in the course of twelve months or less are ruined.—E. H. H., of Mass.

THE MAGNETIC POLE AND THE MERIDIAN.—L. H., in query 3, page 106, asks "how far the pole star is from the zenith of the north pole?" I suppose he means "what is the regular distance of the pole star from the north pole, that is, the azimuth?" I could answer more to the point if he had stated his latitude. The present polar distance of the north star is 1° 22′ 13·4″. The azimuth may be found by the following formula: Let A=azimuth, P=polar distance=1° 22′ 13·4″, L=latitude of place; then A=the sine P divided by the cosine L. To find the magnetic declination (variation), observe the extreme elongation of the pole star, and add the azimuth to the bearing, if the elongation be east. If the western elongation be used, the difference between the azimuth and bearing is the true declination. To find the true meridian: 1st. Suspend a long plumb line from some elevated point, and let the plumb bob pass into a pail of water to reduce its vibrations. Set up a compass or other instrument about 20 feet south of the plumb line. When the pole star and *Alioth* are bisected by the plumb line, that is, when they are both in the same vertical plane, or more accurately 17 minutes afterwards, the pole star is in the true meridian; sight to it then, and fix the line or observe the reading, which will be the true declination of the needle. 2d. Sight to the pole star while apparently moving westward, observe when it seems to come to rest a few moments; it is then at its extreme western elongation. Fix the line thus obtained. Observe likewise the extreme eastern elongation and fix the line, and a line midway between the two is the true meridian. If a transit or theodolite is used in the above observations, it will be necessary to illuminate the cross hairs by the light of a lamp or candle reflected upon them from white paper, as those stars can only be seen in the dark. *Alioth* (*Epsilon ursæ majoris*) is that star in the Great Dipper which is nearest the bowl, and is the third from the end of the handle. Declination in the Western States is east, and *vice versa*.—J. B. J., of Mass.

POWER FOR FAN.—A. D. L., query 9, August 17, will not find any one to tell him how much weight will be required to drive his fan unless he can say how much the work will be; and that will depend chiefly on the pitch of his fan. But he wants 9,000 revolutions in an hour, whatever that pitch may be, and he has 10 feet or 120 inches, or 2 inches per minute, as the speed of his weight. If his barrel be 3 inches in diameter, and the wheel, say, 12 inches with 60 teeth acting on a pinion with 6 teeth, and this pinion carries another 60 teeth wheel, the latter, engaging the pinion of the fan shaft, having 9 teeth, he will get about 9,000 revolutions when his weight has run down; in this case, as he does not know the power exhausted at the working point, he must pile on the weight until he gets the right speed. If I have calculated right, 100 pounds weight would be balanced by about a quarter of a pound added to a leaf of the fan; but a quarter of a pound pressure upon the air displaced by one leaf of the fan would produce a pretty good effect. Will he let us know how he succeeds?—R. H. A., of Md.

PRESERVING POLISHED STEEL SURFACES.—To F. & N., query 22, page 138.—Warm equal parts by weight of white wax and spirits of turpentine, so as to make a salve; lay a very thin coat of it on the polished article, and rub it uniformly over with a dry piece of linen. Or, melt one ounce of paraffin in a glass with a wide mouth by putting the glass in hot water; then add 1½ ounces of petroleum and shake the mixture in the corked bottle until it has stiffened to a salve, which is to be applied as before stated.—A. G. S., of N. Y.

BURSTING OF SAWS.—To J. A. H., query 14, page 58.—It is possible for saws to be run at so high a rate of speed as to burst. An instance came to my knowledge in the town of Blanchard, Piscataquis county, Maine.—F. S. B., of Me.

RED ANTS.—J. C. W., August 10, enquires how to get red ants out of a cupboard. Here is a plan that never fails. Moisten a towel with sweetened water, grease, or anything that will attract them, and spread it in the cupboard, and as soon as it gets covered with them, take it out, and throw it in a kettle of boiling water. Repeat the operation till you kill the last one of them. I have destroyed a whole colony of them in a single night.—D. W. B.

DRILLING HOLES IN GLASS.—W. V. B., query 11, page 138, is informed that to drill holes of any size in glass, he has simply to secure, over the place to be drilled, a thin piece of pine (like that used for backing pictures) with a hole through it the size of the one desired in the glass. This is simply a guide for steadying the drill at starting. The drill is a brass tube of the size desired, the thinner the better. Put a center into the top of it, and run with a common bow, like that used in drilling by watchmakers. Feed the drill with rather fine emery, and keep wet with a saturated solution of gum camphor in spirits of turpentine, and you can drill glass as easily as brass. The tubular drill cuts out a circular core, and the hole can be smoothed or enlarged to any desirable extent with a round file wetted with the solution referred to. Keep the drill upright.—W. E. H.

Communications Received.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On a New Method of Telegraphing.—By C. W.
On Spectrum Analysis.—By W. A. M., Jr.
On Binary Engines. Being a reply to a recent Editorial Article in the SCIENTIFIC AMERICAN.—By. J. A. H. E.
A Mechanical Eye.—By J. E. E.
On the Force of Falling Bodies.—By W. A. A.
On the manufacture of Portland Cement.—By A. O.
On Desirable Household Articles.—By F. G. W.
Science and Theology.—By W. L. T., also E. B.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

STOP COCK.—John Stevens, of New York city, assignor to Joseph H. Devlin, of same place.—This invention relates to a new construction of valve or stop cock for gas, steam pipe, etc., with the object of insuring a good fit, even wear, and satisfactory operation by simple and economical means. The invention consists chiefly in making the valve proper of a perforated disk, which is drawn against the lower side of a perforated plate and turns thereon to open or close the apertures. With this feature is connected a new manner of arranging the upper part of the valve mechanism for giving the valve the requisite quarter turns and holding it tight against its seat.

FRUIT DRYER.—Albert Paige and George Wilkinson, of Chicago, Ill.—This invention relates to a combination, with a fruit pan, of a steam generator having steam tight valve spout and a heater, confined in a heat retaining case, and coming only in contact with the bottom of the generator, whereby the fruit may be steamed and a high heat continuously applied until insects are wholly destroyed, while the evenness of temperature in steam prevents any injury to the fruit and allows all parts of it to become uniformly permeated with the heat.

STEAK MASTICATOR.—Richard F. Cook, of Jacksonville, Florida.—This invention consists of a grooved or corrugated table and a corrugated roller combined in such manner that the steak, being placed on the said table and the roller turned forth and back, the latter will roll over the steak, and crush and masticate it very efficiently, the table and roller being held in contact with each other or with the steak between them by springs, which compensate for the variations in the thickness of the steak.

MACHINE FOR PRESSING ROOFING TILES, ETC.—Calvin J. Merrill, Upper Alton, Ill., assignor to himself, Frank F. Merrill, and Charles C. Merrill, same place.—This invention has for its object to furnish an improved machine for pressing roofing tiles, window caps and sills and other articles, of potter's clay, and consists of segments of wheels or cylinders, which are pivoted to a suitable frame work. To the faces of the segments or cylinders are attached one or more sets of dies, which are so constructed as to give the desired form to the article to be made. The dies are curved to correspond with the curvature of the faces of the segments, wheels, or cylinders, so that they may begin to press the clay at one corner or edge, and may pack and press the clay into all parts of the dies, forcing the surplus clay out at the other corner or edge. In forming roofing tile, the nail holes are formed in the clay while under great pressure by pins inserted in the segments or cylinder, and which pass out through holes in one die to rest against the other die. In using the dies, a small metallic plate, of the same form as the lower die, is placed in said lower die, upon which the clay is pressed, so that the pressed article may be removed from the die by raising the said plate. Suitable mechanism conveys power to the apparatus.

FENCE.—Henry B. Ramsey, Rockville, Ind.—The object of this invention is to furnish a portable fence for farm and other purposes, consisting of panels composed of horizontal rails or slats and upright battens. The fence is supported by means of ground sills and braces attached to alternate panels. The rails are nailed to the battens in the usual manner, and the sills are fastened to the battens by nails or bolts, so as to make the connections secure at about the middle of the sills. The sill will extend about an equal distance in each direction. The brace is attached to one end of the sill, and extends at an angle to the top of the batten, and is fastened at each end. A recess is made in one or more of the rails (preferably in the middle rail). In putting the panels together, the ends of the two panels lap each other, and a projection on the one panel engages with the recess on the other. A notch fits over the top of the sill, while the bottom rail fits into a prepared space, and the second rail from the top fits under the brace where the brace forms an acute angle with the batten. For turning an angle the panels are secured together by bolts. The ends of the panel are prepared alike, so that it is connected to another panel with sills and braces prepared at both ends, as has been described.

MACHINE FOR PUNCHING METAL.—Norman C. Stiles, Middletown, Conn., assignor to the Stiles and Parker Press Company, same place.—This invention consists, first, of a stripper for holding the bar of metal for the withdrawal of the punch after punching the hole, so arranged that it will oscillate when the bar is drawn against it and take any position or inclination that the upper surface of the bar may have, so as to bear alike on opposite sides of the punch, and thus prevent the bar from tilting and the frequent breaking of punches. Secondly, the invention consists in having the stripper suspended from the upper portion of the frame, so as to leave a clear space above the bed die to allow the turning of bar or plate to be punched in any direction, and to facilitate the presenting of wide plates to the punch. Thirdly, an arrangement for adjusting the eccentric toothed ring, by which the punch is shifted higher or lower, whereby a nicer or finer adjustment can be made than with the arrangements heretofore used; and, fourthly, of a punching machine with the plate or table, whereon the bed die and the upper portion of the frame and operating gear are mounted, so pivoted to a stand and provided with braces that the table can be tilted backward to the extent of ninety degrees or less to facilitate the discharging of the punched or stamped articles; the object being to have the table stand at an angle of forty-five degrees, or thereabout, so that the work will slide or fall away from the die as soon as it is stripped from the punch. (See engraving on page 287, volume XXVI. SCIENTIFIC AMERICAN.)

CLOTHES RACK.—Charles J. Schaefer and George W. Schaefer, of Yonkers, N. Y.—This invention consists of a series of bars pivoted upon a holder for swinging horizontally to spread out for receiving the clothes; and the said holder is pivoted to a clamp for securing to the edge of a table, door, or other projection. The said clamp may be secured either to a horizontal or vertical projection and still hold the bars horizontally.

BUTTON.—Alonzo H. Savage, Ashtabula, Ohio.—This invention has for its object to furnish an improved device for fastening buttons to garments in such a way that they will not pull or tear out, and which will enable the buttons to be applied without thread, needles, or machine; and it consists in the combination, with the button plate or head, of a spiral wire or spring, forming the shank and inner plate of the button.

MILK VESSEL.—Maria L. Shade, Fair Grove, Mo.—The object of this invention is to furnish vessels for keeping milk and cream, which shall be secure against worms, insects, etc., and it consists in a round vessel with a contracted base, the expanded rim of the vessel being provided with a surrounding flat flange and a conical pivoted cover, the latter being secured in place by a spring catch.

TURBINE WATER WHEEL.—George C. Stevens and Josiah F. Stevens, of Ayer, Mass.—This invention relates to a new gate arrangement—gate adjusting mechanism; to a new form and construction of guides, and to an adjustable feature of the wheel case; all with the object of improving the operation and facilitating the proper adjustment of all parts of the wheel. The invention consists in the application to turbine wheels of a series of balance gates, each adapted to close two chute channels; in plates that are affixed to the chutes to insure a tight joint; in making the wheel case vertically movable on the gates as they wear; and in making the gates adjustable in pairs.

HORSE HAY RAKE.—George L. Ives, Rome, N. Y.—This invention has special reference to an improvement in the arrangement of the crank shaft and tripping mechanism, whereby the rake is raised and lowered for discharging the gathered hay. The inventor proposes to extend the crank shaft to both wheels, and gear it with them by pinions and wheels, and arrange the pinions so they can turn backward on the crank shaft loosely, but provide a ratchet and pawl so that in turning forward they engage the shaft and turn it. Thus a double geared arrangement may be obtained for working the rake without side draft, and yet it will not interfere with the running of the machine around curves, or the turning of one of the truck wheels faster than the other.

IMPROVED CORPSE PRESERVER.—Nicholas F. Curran, Baltimore city, Md.—The invention consists in placing double glasses with covers on the top of case, in arranging air spaces between the outer shell and ice spaces, in attaching ice chambers rigidly to sides but entirely independent of top and bottom, and in making the whole burial casket in three pieces. By these improvements, the body can be first laid out on the cooling board, the other parts of casket then put around it, and boxes of ice finally placed in their appropriate chambers. This avoids all nailing, screwing, rattling of ice or shifting of the body, and is doubtless a very decided improvement over anything heretofore known in this branch of art.

IMPROVED FARE BOX.—John C. Schooley, New York city.—The great aim in this invention is chiefly to provide a hand or portable fare box so constructed as to insure two results: 1st, that the money or fares once deposited cannot be abstracted through the mouth or entrance, and 2dly, that the natural movement of the hand in raising the box to receive a fare shal cause the fare last put in the box to be deposited in the inner compartment or chamber out of reach of wires or other means of manipulation which may be employed to secure it. The object is attained by a peculiar but exceedingly simple arrangement of inclined planes or partitions and hinged valves. For particular or further information, see the patent.

WASHING MACHINE.—John S. Ord, Soquel, Cal.—The invention consists in simultaneously operating two corrugated rubbers reversely over clothes resting upon a stationary rubber, in using a slotted holder and double crank shaft to give simultaneous but reverse motion to the top rubbers, in combining the top rubbers operated by a crank shaft passing through their slotted holders, with a top bar in movable bearings.

DROP HAMMER.—Norman C. Stiles, Middletown, Conn., assignor to the Stiles and Parker Press Company, of same place.—The invention consists in certain improvements upon drop hammers or presses. The spool for raising the hammer by the belt is arranged on the shaft so that it can turn independently of it and slide endwise, with a considerable range between the clutches, with which it connects alternately. Said clutches are connected with and turned by their respective driving wheels, which turn in opposite directions and are kept constantly in motion. A wide collar is made at one end of the spool, with a groove in its face, with which the pin of a shifting bar engages to move the spool endwise for connecting and disconnecting it with the clutches, also to keep the spool clear of the clutches when the hammer falls. To have the spool turned alternately by the two driving wheels to raise the hammer, it is necessary for the shifter to be moved as follows: The spool being midway between the clutches at the moment the hammer begins to fall, said shifter will then move the spool—say to the right—into gear with clutch plate 1, which raises the hammer; then said shifter will move the spool to the left far enough to disconnect it from clutch 1; then, when the hammer falls again, it will move again to the left, gearing the spool with clutch 2; then, after the hammer is raised, it will move to the right to the center; and then, after the hammer again falls, it will move to the right to connect with clutch 1 again, and so on.

SEED AND GUANO DISTRIBUTOR.—William J. West, Greenville, S. C.—The invention consists in providing a seeder hopper with a pendent swinging shoe, whereby the grain and guano are held until said shoe is tilted, shaken and caused to distribute it; in providing the shoe with a leather or other tube placed centrally at the conveying end so as to place the seed always in the middle of the furrow; and in a plumb, so placed as to enable the operator always to know when he has the shoe at the proper inclination.

IMPROVED SOLDERING APPARATUS.—Wm. D. Brooks, Baltimore, Md.—The invention consists in a new mode of applying a blowpipe to soldering machinery, of absorbing and carrying off the heat that rises from the burners, of adapting the cap holder to adjust itself to the can which is being soldered, and of preventing the escape of heat in a lateral direction. By these improvements, the tray can be slid forward and the cans can be soldered as fast as they can be handled, while a sounder joint than usual is provided in one tenth the time and at greatly less expense.

CHECK VALVE INDICATOR.—Joseph G. Blackburn, New York city, assignor to himself and Frank M. Kimberly, same place.—This invention has for its object to furnish an improved device for attachment to check valves to show whether they are working properly, and which may be applied with the same facility to an old as to a new valve. The invention consists in combining a glass tube, stem, and bonnet with a check valve, so that the latter can always be seen by the engineer, while the former can be readily detached to obtain access thereto.

NEW BOOKS AND PUBLICATIONS.

THE SALE OF PATENTS. By William E. Simonds, Attorney and Counsellor at Law, Hartford, Conn. Price $1.25.

A neatly printed little volume of 100 pages. In addition to the usual forms for assignments, licenses, contracts, etc., the author gives, under appropriate heads, some very useful hints on the best mode of introducing, and the value of, new inventions. One chapter is devoted to "Newspaper Advertising," in which he points out the importance to patentees of having their inventions illustrated and described in the SCIENTIFIC AMERICAN and other kindred publications.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]
From August 30 to September 9, 1872, inclusive.

COLORED PAPER.—G. La Monte, G. G. Saxe, C. H. Clayton, New York city.
ELECTRIC GAS LIGHTER.—Electric Gas Lighting Company, New York city.
ELECTRIC GAS LIGHTER.—J. P. Tirrell, Charlestown, J. W. Hether, W. C. Clarke, Chelsea, Mass.
MAKING MOLDS.—J. Anderson (of New York city), Glasgow, Scotland.
MORTISING MACHINE.—J. Richards, Philadelphia, Pa.
PARALLEL RULER.—T. Bergner, Philadelphia, Pa.
PURIFYING GAS.—E. White, New York city.
PULVERIZER AND SEPARATOR.—R. Spencer, New York city.
REAPER AND MOWER.—W. A. Wood, Hoosick Falls, N. Y.
ROTARY ENGINE.—E. P. Jones, Leflore county, Miss.
SEWING MACHINE.—I. P. & C. D. Fishburn, Cincinnati, Ohio.

[OFFICIAL.]

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FOR THE WEEK ENDING SEPTEMBER 10, 1872, AND EACH BEARING THAT DATE.

SCHEDULE OF PATENT FEES:

On each Caveat	$10
On each Trade-Mark	$25
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Wagons, etc., skein and box for, J. R. Davies	131,213
Wardrobe, portable, T. R. Timby	131,313
Washboard, J. S. Brooks	131,246
Washing machine, A. H. Calkins	131,149
Washing machine, J. Lowth	131,172
Washing machine, A. Richardson	131,227
Watches, reversible pinion for, J. K. Bigelow	131,208
Water wheel, turbine, W. A. Terry	131,233
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Wrench, pipe, J. Craig	131,252
Yarn, machine for beaming, J. C. Arms	131,205
Yoke for harness, neck, S. Burgess	131,249

DESIGNS PATENTED.

6,119.—CAMPAIGN LAMP.—T. Adams, Hudson City, N. J.
6,120 to 6,126.—OIL CLOTHS.—J. Hutchison, Newark, N. J.
6,127 and 6,128.—OIL CLOTHS.—H. Kagy, Philadelphia, Pa.
6,129 to 6,133.—OIL CLOTHS.—J. Meyer, Lansingburgh, N. Y.
6,134.—RANGE STOVE.—J. R. Rose and E. L. Caleiy, Jr., Philadelphia, Pa.
6,135.—BASE BURNING STOVE.—D. Smith, Albany, N. Y.
6,136.—SHOW CASE.—L. Wiegel and J. Lehnbeuter, Cincinnati, Ohio.
,137 to 6,139.—CARPETS.—G. C. Wright, New York city.

TRADE MARKS REGISTERED.

984.—WINE OF THE ALLSPICE.—G. De Cordova, New York city.
985.—CANNED OYSTERS, ETC.—D. D. Mallory & Co., Baltimore, Md.
986.—WOOL DETERGENT, ETC.—Myers & Co., Philadelphia, Pa.
987.—HOGS' LARD.—W. H. Popham, New York city.
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989.—COOKING STOVE.—Shinnick, Woodside & Gibbons, Zanesville, Ohio.
990.—WELL POINTS AND DRILLS.—W. P. Smith, New Orleans, La.
991.—SHIRTS.—Stern & Co., New York city.
992.—SADDLERS' HARDWARE, ETC.—Van Wart, Son & Co., Birmingham, Eng.

APPLICATIONS FOR EXTENSIONS.

Applications have been duly filed, and are now pending, for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:

22,310.—NUT-MAKING MACHINE.—J. B. Savage. Nov. 27, 1872.
22,340.—PEGGING JACK.—T. D. Bailey. Dec. 4, 1872.
22,364.—CAR SEAT AND COUCH.—P. B. Greene. Dec. 4, 1872.
22,491.—BILLIARD CUE TIP.—H. W. Collender. Dec. 18, 1872.

EXTENSION GRANTED.

21,077.—SEPARATING THE FIBER OF WOOD.—A. S. Lyman.

EXTENSION REFUSED.

21,465.—SEWING MACHINE.—S. C. Blodgett.

Practical Hints to Inventors.

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In order to have such search, make out a written description of the invention, in your own words, and a pencil, or pen and ink, sketch. Send these, with the fee of $5, by mail, addressed to MUNN & Co., 37 Park Row, and in due time you will receive an acknowledgment thereof, followed by a written report in regard to the patentability of your improvement. This special search is made with great care, among the models and patents at Washington, to ascertain whether the improvement presented is patentable.

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The applicant for a patent should furnish a model of his invention if susceptible of one, although sometimes it may be dispensed with; or, if the invention be a chemical production, he must furnish samples of the ingredients of which his composition consists. These should be securely packed, the inventor's name marked on them, and sent by express, prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by a draft, or postal order, on New York, payable to the order of MUNN & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents.

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American inventions, even if already patented in this country, can be patented in Canada provided the American patent is not more than one year old.

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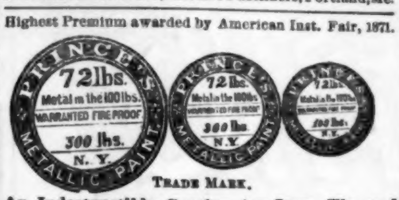

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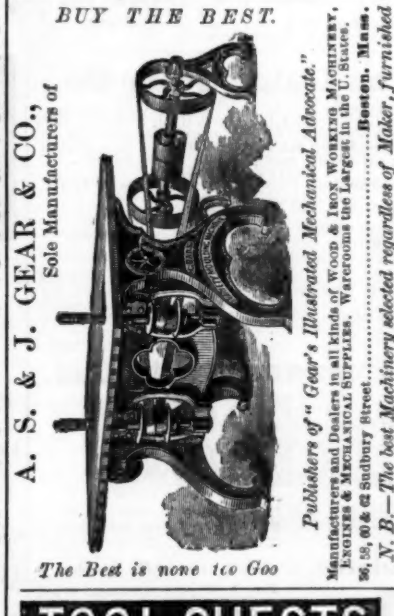

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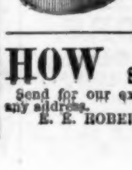

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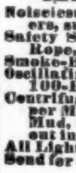

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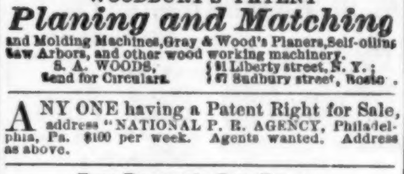

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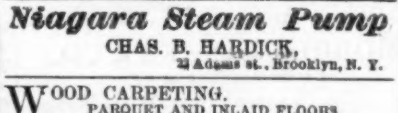

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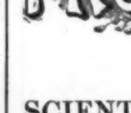

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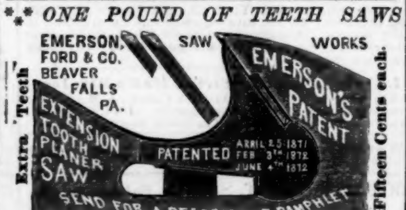

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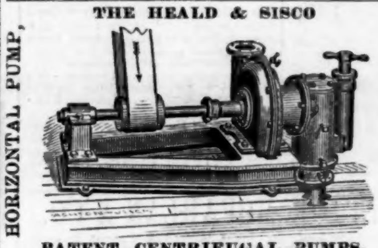

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